United States
Department of
Agriculture

Natural
Resources
Conservation
Service

In cooperation with
Louisiana Agricultural
Experiment Station,
Louisiana State Soil and
Water Conservation
Committee, and Louisiana
Tech University, College
of Life Sciences

Soil Survey of Lincoln Parish, Lousiana

How To Use This Soil Survey

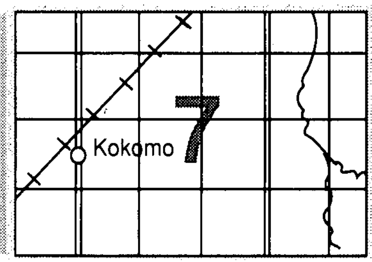
General Soil Map

The general soil map, which is the color map preceding the detailed soil maps, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

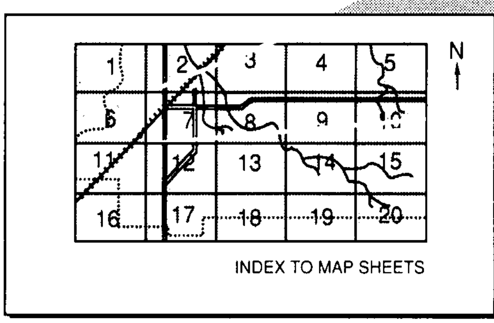
Detailed Soil Maps

The detailed soil maps follow the general soil map. These maps can be useful in planning the use and management of small areas.



MAP SHEET

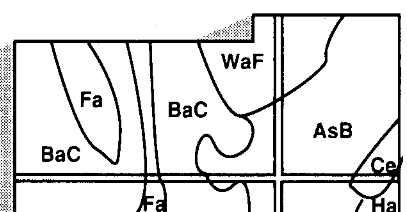
To find information about your area of interest, locate that area on the **Index to Map Sheets**, which precedes the soil maps. Note the number of the map sheet, and turn to that sheet.



INDEX TO MAP SHEETS

Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Turn to the **Index to Map Units** (see Contents), which lists the map units by symbol and name and shows the page where each map unit is described.

MAP SHEET



AREA OF INTEREST

NOTE: Map unit symbols in a soil survey may consist only of numbers or letters, or they may be a combination of numbers and letters.

The **Summary of Tables** shows which table has data on a specific land use for each detailed soil map unit. See **Contents** for sections of this publication that may address your specific needs.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service, formerly the Soil Conservation Service, has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1990. Soil names and descriptions were approved in 1991. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1990. This soil survey was made cooperatively by the Natural Resources Conservation Service, the Louisiana Agricultural Experiment Station, the Louisiana State Soil and Water Conservation Committee, and the Louisiana Tech University, College of Life Sciences. It is part of the technical assistance furnished to the D'Arbonne Soil and Water Conservation District.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

All programs and services of the Natural Resources Conservation Service are offered on a nondiscriminatory basis, without regard to race, color, national origin, religion, sex, age, marital status, or handicap.

Cover: A peach orchard in an area of Darley gravelly fine sandy loam, 1 to 5 percent slopes.

Contents

Issued April 1996

Index to Map Units

Summary of Tables

Foreword

This soil survey contains information that can be used in land-planning programs in Lincoln Parish. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

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Soil Survey of
Lincoln Parish, Louisiana

By W. Wayne Kilpatrick, Curtis Godfrey, and Charles Henry, Jr., Natural Resources Conservation Service

United States Department of Agriculture, Natural Resources Conservation Service, in cooperation with
the Louisiana Agricultural Experiment Station, the Louisiana State Soil and Water Conservation Committee, and the Louisiana Tech University, College of Life Sciences

LINCOLN PARISH is in the north-central part of Louisiana (fig. 1). It has a total area of 302,300 acres. It includes no large bodies of water. The parish is bordered on the north by Union Parish, on the east by Union and Ouachita Parishes, on the south by Jackson and Bienville Parishes, and on the west by Bienville and Claiborne Parishes. In 1988, it had a population of 44,000. Ruston, the parish seat, has a population of 22,000 and is the largest city in the parish. Other communities are Choudrant, Dubach, Grambling, Simsboro, and Vienna.

The parish consists of three major physiographic areas: the level and nearly level flood plains, the gently sloping and very gently sloping stream terraces, and the very gently sloping to moderately steep uplands. Elevations range from about 71 feet above sea level on the flood plain of the Bayou D'Arbonne in the northeastern part of the parish to about 407 feet in the uplands southwest of Simsboro.

The flood plains make up about 12 percent of the land area in the parish. They occur throughout the parish, along streams that drain the uplands. The soils on the flood plains are loamy and range from poorly drained to well drained. They are used mainly as woodland. Several small areas are used as pasture or cropland. The poorly drained soils are in the lower areas. Wetness and flooding are limitations affecting land use in these areas. The well drained soils are at the slightly higher elevations on low ridges. Flooding, mainly during winter and spring, is a hazard affecting land use in these areas.

The stream terraces make up about 4 percent of the land area in the parish. They occur as narrow bands that parallel the flood plains along the major streams, or they occur as small islands on the flood plains. The soils on these terraces are mainly loamy. They have low fertility. They are used mainly as woodland. A small acreage is used for cultivated crops or pasture. The slope and wetness are limitations in areas used for crops or pasture.

Figure 1.—Location of Lincoln Parish in Louisiana.

The uplands make up about 84 percent of the land

area in the parish. They occur throughout the parish. The soils in the uplands are gravelly, sandy, or loamy and range from somewhat poorly drained to somewhat excessively drained. They generally have low or medium fertility. The soils are used mainly as woodland. A small acreage is used for pasture or cultivated crops. The hazard of erosion generally is the main management concern. The slope and the low fertility are additional limitations in areas used for crops or pasture.

General Nature of the Parish

Twyla Moore, D'Arbonne Soil and Water Conservation District, helped prepare this section.

This section gives general information about Lincoln Parish. It describes climate, history and development, agriculture, transportation, and industry.

Climate

Table 1 gives data on temperature and precipitation for the survey area as recorded at Homer in the period 1951 to 1979. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter, the average temperature is 47 degrees F and the average daily minimum temperature is 36 degrees. The lowest temperature on record, which occurred at Homer on January 12, 1962, is -1 degree. In summer, the average temperature is 80 degrees and the average daily maximum temperature is 92 degrees. The highest recorded temperature, which occurred at Homer on August 31, 1951, is 107 degrees.

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (50 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is about 52 inches. Of this, 26 inches, or 50 percent, usually falls in April through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 20 inches. The heaviest 1-day rainfall during the period of record was 5.77 inches at Homer on April 29, 1953. Thunderstorms occur on about 55 days each year.

The average seasonal snowfall is about 1 inch. The greatest snow depth at any one time during the period of record was 5 inches. There is seldom a day when at least 1 inch of snow is on the ground.

The average relative humidity in midafternoon is about 55 percent. Humidity is higher at night, and the average at dawn is about 90 percent. The sun shines 70 percent of the time possible in summer and 50 percent in winter. The prevailing wind is from the south. Average windspeed is highest, 10 miles per hour, in late winter and early spring.

History and Development

The survey area was first settled in the early 1800's. The population, however, did not increase significantly until after the Civil War.

In 1873, Lincoln Parish was established from portions of neighboring parishes, including Claiborne Parish. Vienna was the parish seat.

About the time Lincoln Parish was established, work resumed on the Vicksburg, Shreveport, and Pacific Railroad. Tracks laid in Mississippi were extended to Texas. In 1883, Robert E. Russ offered 640 acres to the V.S.&P. Railroad, stipulating that the tracks run across the property and that the land be used as a town site. In 1884, the town of Ruston, named for Russ, was established and became the new parish seat.

Railroads, including the Chicago, Rock Island, and Pacific Railroads, which crossed the parish from north to south, influenced the economic development of Lincoln Parish. The early citizens were farmers and foresters. Historically, the parish has not been highly industrialized. After Highway 167 and Interstate 20 were constructed, however, the parish gained new industries, and industrial growth in the parish continues.

Agriculture

Agriculture is an important industry in Lincoln Parish. Cotton was the main cash crop before 1950, and north-central Louisiana was previously a primary cotton-producing area in the State. Thousands of acres of cropland, however, have been converted to pine tree plantations or pasture during the last 40 years.

In 1987, according to the Census of Agriculture, cropland in Lincoln Parish totalled 24,698 acres and improved pasture totalled 28,474 acres. The average size of a farm was 168 acres.

In 1989, according to the Louisiana Summary of Agriculture and Natural Resources, the main agricultural enterprises in the parish were poultry, forestry, cattle, and horticultural crops. Peaches and watermelons are the main horticultural crops.

The present trend in Lincoln Parish indicates that major land uses will not change in the near future.

Transportation

Lincoln Parish is served by Interstate 20, Highways 80 and 167, and numerous State highways. Several interstate common carriers and intercity bus carriers have terminals in Ruston. Rail service is available to the parish from the Ruston area.

The parish had one airport for general aviation. In 1991, the construction of a new airport with a 5,000-foot runway was completed near Ruston. Commercial air service is provided by three major airlines in Monroe, about 40 miles from Ruston.

Industry

Lincoln Parish has many manufacturing facilities. Some facilities market wood products, dairy products, poultry, light metals, glass, or the natural resources of the parish, such as oil and gas. Others manufacture mobile homes, pipe insulation, wiring harnesses, or rubber coating.

The parish offers large opportunities for employment in insurance, construction, retail, and transportation services. Many local residents are employed by Louisiana Tech University or Grambling State University. The parish consistently has a low unemployment rate.

How This Survey Was Made

This survey was made to provide information about the soils in the survey area. The information includes a description of the soils and their location and a discussion of the suitability, limitations, and management of the soils for specified uses. Soil scientists observed the steepness, length, and shape of slopes; the general pattern of drainage; the kinds of crops and native plants growing on the soils; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material from which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils in the survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil is associated with a particular kind of landscape or with a segment of the landscape. By observing the soils in the survey area and relating their position to specific segments of the landscape, a soil scientist develops a concept, or model, of how the soils were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. The system of taxonomic classification used in the United States is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area are generally collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given

soil will have a high water table within certain depths in most years, but they cannot assure that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Map Unit Composition

A map unit delineation on a soil map represents an area dominated by one major kind of soil or an area dominated by two or three kinds of soil. A map unit is identified and named according to the taxonomic classification of the dominant soil or soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural objects. In common with other natural objects, they have a characteristic variability in their properties. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of soils of other taxonomic classes. Consequently, every map unit is made up of the soil or soils for which it is named and some soils that belong to other taxonomic classes. In the detailed soil map units, these latter soils are called inclusions or included soils. In the general soil map units, they are called soils of minor extent.

Most inclusions have properties and behavioral patterns similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting (similar) inclusions. They may or may not be mentioned in the map unit descriptions. Other inclusions, however, have properties and behavior divergent enough to affect use or require different management. These are contrasting (dissimilar) inclusions. They generally occupy small areas and cannot be shown separately on the soil maps because of the scale used in mapping. The inclusions of contrasting soils are mentioned in the map unit descriptions. A few inclusions may not have been observed and consequently are not mentioned in the descriptions, especially where the soil pattern was so complex that it was impractical to make enough observations to identify all of the kinds of soils on the landscape.

The presence of inclusions in a map unit in no way diminishes the usefulness or accuracy of the soil data. The objective of soil mapping is not to delineate pure taxonomic classes of soils but rather to separate the landscape into segments that have similar use and management requirements. The delineation of such landscape segments on the map provides sufficient information for the development of resource plans, but onsite investigation is needed to plan for intensive uses in small areas.

General Soil Map Units

The general soil map at the back of this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, it consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one unit can occur in another but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or a building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

The soils in the survey area vary widely in their suitability for major land uses. Table 4 shows the extent of the map units shown on the general soil map. It also shows the suitability of each for major land uses and the soil properties that limit use.

Each map unit is rated for *cultivated crops, pasture, woodland, urban uses,* and *recreational areas.* Cultivated crops are those grown extensively in the survey area. Pasture refers to areas of native grasses or tame grasses and legumes. Woodland refers to areas of native or introduced trees. Urban uses include residential, commercial, and industrial developments. Intensive recreational areas are campsites, picnic areas, ballfields, and other areas that are subject to heavy foot traffic.

The boundaries of the general soil map units in Lincoln Parish were matched, where possible, with those of the previously published surveys of Claiborne and Ouachita Parishes, Louisiana. In a few places, however, the lines do not join and the names of the map units differ. These differences resulted mainly from changes in soil series concepts, differences in map unit design, and changes in soil patterns near survey area boundaries.

The general soil map units in this survey have been grouped according to general landscapes. Descriptions of each of the broad groups and the map units in each group follow.

Soils on Flood Plains

These are mainly poorly drained, moderately well drained, and well drained, loamy soils on flood plains. They are frequently flooded. These soils make up about 12 percent of Lincoln Parish. Most of the acreage is woodland. Seasonal wetness and flooding are the main limitations affecting most uses.

1. Guyton-Iuka-Ouachita

Level and nearly level, poorly drained, moderately well drained, and well drained soils that are loamy throughout

This map unit consists of soils on flood plains along the major streams. These soils are frequently flooded. The flooding occurs mainly in winter and spring but can occur during any part of the year. Slopes range from 0 to 2 percent.

This map unit makes up about 12 percent of the parish. It is about 38 percent Guyton soils, 35 percent Iuka soils, 18 percent Ouachita soils, and 9 percent soils of minor extent.

The Guyton soils are level and poorly drained. They are in level and depressional areas. They have a surface layer of dark grayish brown silt loam. The subsurface layer is grayish brown and light brownish gray, mottled silt loam. The next layer is grayish brown, mottled silty clay loam and gray silt loam. The subsoil is gray, mottled silty clay loam.

The Iuka soils are level and moderately well drained. They are on narrow flats and in low areas on the flood plains. They have a surface layer of dark brown fine sandy loam. The next layer is dark yellowish brown, mottled silt loam. The underlying material is yellowish brown, mottled fine sandy loam in the upper part; grayish brown, mottled loam in the next part; and gray, mottled loam in the lower part.

The Ouachita soils are nearly level and well drained. They are on low ridges on the flood plains. They have a surface layer of brown silt loam. The next layer is dark

yellowish brown silt loam. The subsoil is yellowish brown and dark yellowish brown, mottled silty clay loam. The substratum is yellowish brown, mottled fine sandy loam.

Of minor extent in this map unit are Cahaba and Dela soils. Dela soils make up the largest acreage of the minor soils. Cahaba soils are on stream terraces that appear as small islands on the flood plains. Dela soils are on low ridges on the flood plains.

Most areas of this map unit are used as woodland. A small acreage is used as pasture or cropland.

The soils in this map unit are moderately well suited to woodland. Because of the flooding and seasonal wetness, the use of equipment is restricted and seedling mortality is a problem. Competition from understory plants and windthrow are additional concerns in producing timber. The surface layer becomes compact if heavy equipment is used when the soils are moist.

The Guyton and Ouachita soils generally are poorly suited to crops and pasture because of the flooding and the seasonal wetness. The Iuka soils are moderately well suited to these uses.

The soils in this map unit are poorly suited to urban development and intensive recreational uses because of the flooding and the seasonal wetness. They generally are not suitable as sites for dwellings.

Soils on Stream Terraces

These are mainly well drained, moderately well drained, and somewhat poorly drained, gently sloping and very gently sloping loamy soils on terraces. They make up about 4 percent of Lincoln Parish. Most of the acreage is woodland. A small acreage is used as cropland or pasture. Seasonal wetness, the slope, low fertility, and potential aluminum toxicity are the main limitations affecting agricultural uses. The wetness and moderate or moderately slow permeability are the main limitations affecting most urban uses.

2. Dubach-Gurdon

Gently sloping and very gently sloping, well drained, moderately well drained, and somewhat poorly drained soils that are loamy throughout

This map unit consists of soils on narrow or broad ridges on terraces. Slopes range from 1 to 5 percent.

This map unit makes up about 4 percent of the parish. It is about 67 percent Dubach soils, 18 percent Gurdon soils, and 15 percent soils of minor extent.

The Dubach soils are gently sloping and well drained or moderately well drained. They have a surface layer of brown fine sandy loam. The subsurface layer is yellowish brown and light yellowish brown fine sandy loam. The upper part of the subsoil is strong brown clay loam and yellowish brown, mottled clay loam. The lower part is yellowish brown and strong brown, mottled sandy clay loam.

The Gurdon soils are very gently sloping and somewhat poorly drained. They have a surface layer of brown silt loam. The subsurface layer is pale brown silt loam. The subsoil is yellowish brown, mottled silt loam in the upper part and yellowish brown, mottled silty clay loam in the lower part.

Of minor extent in this map unit are the well drained Cahaba soils on narrow convex ridges.

Most areas of this map unit are used as woodland. A small acreage is used as pasture or cropland.

The Dubach soils are well suited to woodland. The Gurdon soils are moderately well suited to this use. Wetness restricts the use of equipment during winter and spring in areas of the Gurdon soils. Rutting and compaction are problems if heavy equipment is used when the soils are moist. Competition from understory plants also can be a concern in producing timber.

The soils in this map unit are moderately well suited to crops. The slope, low fertility, and potentially toxic levels of exchangeable aluminum in the root zone are the main limitations. The seasonal wetness also is a limitation in areas of the Gurdon soils.

The soils in this map unit are well suited to pasture. The low fertility, the slope, and the wetness are the main limitations.

The Dubach soils generally are moderately well suited to urban development and well suited to intensively used recreational areas. The Gurdon soils are poorly suited to these uses because of the seasonal wetness. Moderate or moderately slow permeability and the slope are additional limitations.

Soils on Uplands

These are mainly somewhat excessively drained to moderately well drained, very gently sloping to moderately steep soils on ridgetops and side slopes in the uplands. They make up about 84 percent of Lincoln Parish. Most of the acreage is woodland. A small acreage is used as pasture or cropland. The slope is the main limitation affecting most uses.

3. Sacul-Bowie

Gently sloping to moderately steep, moderately well drained soils that have a loamy surface layer and a clayey and loamy subsoil or a loamy subsoil

This map unit consists of soils on gently sloping ridgetops and moderately sloping to moderately steep side slopes. The ridgetops are narrow or broad. The landscape is dissected by many narrow drainageways.

Slopes range from 1 to 5 percent on the ridgetops and from 5 to 30 percent on the side slopes.

This map unit makes up about 8 percent of the parish. It is about 50 percent Sacul soils, 36 percent Bowie soils, and 14 percent soils of minor extent.

The Sacul soils are on gently sloping ridgetops and strongly sloping or moderately steep side slopes. They have a surface layer of dark brown or dark grayish brown very fine sandy loam. The subsurface layer is yellowish brown very fine sandy loam. The subsoil is yellowish red silty clay in the upper part; red, mottled clay in the next part; and gray, mottled silty clay loam in the lower part.

The Bowie soils are on gently sloping, narrow or broad ridgetops and on moderately sloping side slopes. They have a surface layer of dark brown or brown fine sandy loam. The subsurface layer is yellowish brown fine sandy loam. The subsoil is strong brown sandy clay loam and yellowish brown, mottled sandy clay loam in the upper part and mottled yellowish brown, red, and gray sandy clay loam in the lower part.

Of minor extent in this map unit are Angie, Guyton, and Mahan soils. Angie soils are on broad ridgetops and are moderately well drained. Guyton soils are on narrow flood plains. Mahan soils are on narrow convex ridgetops and the upper side slopes.

Most areas of this map unit are used as woodland. Erosion is a hazard on the steeper slopes. In areas of the Sacul soils, rutting and compaction are problems if the areas are logged during wet periods.

The Sacul soils generally are poorly suited to cultivated crops. The Sacul soils on strongly sloping or moderately steep side slopes generally are not suited to crops because of a severe hazard of erosion. The Bowie soils on gently sloping ridgetops are moderately well suited to crops. The moderately sloping Bowie soils are poorly suited to crops because of the slope and the hazard of erosion. Special conservation practices are needed to control erosion.

The gently sloping and strongly sloping Sacul soils and the moderately sloping Bowie soils are moderately well suited to pasture. The Bowie soils on gently sloping ridgetops are well suited this use, and the moderately steep Sacul soils are poorly suited. The main limitation is low fertility. Erosion is a hazard.

The Sacul soils generally are poorly suited to urban development and moderately well suited to most intensive recreational uses. The Bowie soils are moderately well suited to urban development and well suited to intensive recreational uses. Slow or moderately slow permeability, a high shrink-swell potential, the slope, and low strength on sites for roads are the main limitations.

4. McLaurin-Betis

Very gently sloping to strongly sloping, well drained and somewhat excessively drained soils that have a sandy surface layer and a loamy or sandy subsoil

This map unit consists of soils on ridgetops and side slopes in the uplands. Slopes range from 1 to 5 percent on the ridgetops and from 5 to 12 percent on the side slopes.

This map unit makes up about 3 percent of the land area in the parish. It is about 56 percent McLaurin soils, 28 percent Betis soils, and 16 percent soils of minor extent.

The McLaurin soils are very gently sloping and well drained. They are on convex ridgetops. They have a surface layer of dark brown loamy fine sand. The next layer is yellowish brown loamy fine sand. The subsoil is red loam and sandy loam in the upper part, yellowish red and light yellowish brown sandy loam in the next part, and yellowish red sandy clay loam in the lower part.

The Betis soils are gently sloping and strongly sloping. They are somewhat excessively drained. They are on ridgetops and on side slopes in the uplands. They have a surface layer of brown or dark grayish brown loamy fine sand. The subsurface layer is light yellowish brown loamy fine sand. The subsoil is strong brown loamy fine sand in the upper part and pale brown fine sand and yellowish red loamy fine sand in the lower part.

Of minor extent in this map unit are Briley and Trep soils on some of the ridgetops.

Most areas of this map unit are used as woodland. A small acreage is used as cropland or pasture.

The McLaurin soils are well suited to woodland. The Betis soils are moderately well suited to this use. Traction is poor on the sandy surface layer of the Betis soils during dry periods, and seedling mortality is moderate because of droughtiness.

The soils in this map unit generally are moderately well suited to crops. The strongly sloping Betis soils generally are not suited to crops. The main limitations are the slope, low fertility, potential aluminum toxicity, and the droughtiness.

The McLaurin soils are well suited to pasture, and the Betis soils generally are moderately well suited. The strongly sloping Betis soils are poorly suited to this use. The low fertility, the slope, and the droughtiness are the main limitations.

The soils in this map unit generally are moderately well suited to most urban uses. The McLaurin soils are well suited to most intensive recreational uses, and the Betis soils are moderately well suited. The slope is the main limitation affecting sites for playgrounds, and

seepage is the main problem on sites for sanitary facilities. Shallow excavations are difficult to construct because cutbanks cave easily. The droughtiness is a limitation affecting lawn grasses and ornamentals.

5. Darley-Bowie

Gently sloping to moderately steep, well drained and moderately well drained soils that have a gravelly or loamy surface layer and a clayey and loamy subsoil or a loamy subsoil

This map unit consists of soils on gently sloping ridgetops and moderately sloping to moderately steep side slopes. These soils are mainly in the north-central and northwestern parts of the parish. Slopes range from 1 to 5 percent on the ridgetops and from 5 to 30 percent on the side slopes.

This map unit makes up about 6 percent of the parish. It is about 50 percent Darley soils, 36 percent Bowie soils, and 14 percent soils of minor extent.

The Darley soils are well drained. They are on gently sloping ridgetops and strongly sloping or moderately steep side slopes. They have a surface layer of dark brown or reddish brown gravelly fine sandy loam. The subsurface layer is yellowish red gravelly fine sandy loam. The subsoil is yellowish red and red sandy clay in the upper part, red clay in the next part, and yellowish red sandy clay loam in the lower part. The middle part of the subsoil is interlayered with ironstone.

The Bowie soils are moderately well drained. They are on narrow or broad, gently sloping ridgetops and on moderately sloping side slopes. They have a surface layer of dark brown or brown fine sandy loam. The subsurface layer is yellowish brown fine sandy loam. The subsoil is sandy clay loam. It is strong brown and yellowish brown and mottled in the upper part and mottled yellowish brown, red, and gray in the lower part.

Of minor extent in this map unit are Angie and Sacul soils. Angie soils are on broad ridgetops. Sacul soils are on some of the ridgetops and on the lower side slopes. The minor soils are moderately well drained.

Most areas of this map unit are used as woodland. A small acreage is used as cropland or pasture.

The soils in this map unit generally are well suited to woodland. The moderately steep soils are moderately well suited to this use because of the hazard of erosion.

The strongly sloping or moderately steep Darley soils generally are not suited to crops. The hazard of erosion is a severe limitation. The Bowie and Darley soils on gently sloping ridgetops are moderately well suited to crops. The slope, low or medium fertility, droughtiness, and potentially toxic levels of exchangeable aluminum are the main limitations. The Bowie soils on moderately sloping side slopes are poorly suited to crops because of the slope and the hazard of erosion.

The soils in this map unit generally are moderately well suited to pasture. The moderately steep soils are poorly suited to pasture, and the gently sloping Bowie soils are well suited. The slope is the main limitation. The hazard of erosion is severe on side slopes. Lime and fertilizer are needed for optimum forage production.

The soils in this map unit generally are moderately well suited to urban development and intensive recreational uses. The moderately steep soils are poorly suited to urban and recreational uses. The slope, the ironstone layers in the subsoil, moderately slow or slow permeability, and small stones on the surface are the main limitations.

6. Darley-Mahan

Gently sloping to moderately steep, well drained soils that have a gravelly or loamy surface layer and a clayey and loamy subsoil

This map unit consists of soils on gently sloping ridgetops and strongly sloping to moderately steep side slopes in the uplands. Slopes range from 1 to 5 percent on the ridgetops and from 5 to 30 percent on the side slopes.

This map unit makes up about 25 percent of the parish. It is about 40 percent Darley soils, 37 percent Mahan soils, and 23 percent soils of minor extent.

The Darley soils are gently sloping, strongly sloping, and moderately steep. They have a surface layer of dark brown or reddish brown gravelly fine sandy loam. The subsurface layer is yellowish red gravelly fine sandy loam. The subsoil is yellowish red and red sandy clay in the upper part, red clay in the next part, and yellowish red sandy clay loam in the lower part. The middle part of the subsoil is interlayered with sandstone.

The Mahan soils are gently sloping and strongly sloping. They have a surface layer of dark brown or yellowish brown fine sandy loam. The subsurface layer is yellowish red fine sandy loam. The subsoil is red sandy clay in the upper part and red, mottled sandy clay loam in the lower part. The substratum is red, stratified sandy clay loam and sandy loam.

Of minor extent in this map unit are Angie soils on broad ridgetops and Sacul soils on some of the ridgetops and on the lower side slopes.

Most areas of this map unit are used as woodland. A small acreage is used as cropland or pasture.

The soils in this map unit generally are well suited to woodland. The moderately steep Darley soils are moderately well suited because of the hazard of erosion.

The gently sloping Darley and Mahan soils on

ridgetops are moderately well suited to crops. The slope, medium fertility, droughtiness, and potential aluminum toxicity in the root zone are the main limitations. The strongly sloping and moderately steep soils generally are not suited to crops because of the slope and a severe hazard of erosion.

The soils in this map unit generally are moderately well suited to pasture. The gently sloping Mahan soils on ridgetops are well suited to this use. The moderately steep Darley soils are poorly suited to this use because of the severe hazard of erosion. The medium fertility and the droughtiness are limitations. Erosion is a hazard.

These soils generally are moderately well suited to urban development and intensive recreational uses. The moderately steep soils are poorly suited to most of these uses. The ironstone layers in the subsoil, moderate or moderately slow permeability, the slope, small stones on the surface, and low strength on sites for roads and streets are the main limitations. Erosion is the main hazard.

7. McLaurin-Briley-Darley

Very gently sloping to moderately steep, well drained soils that have a sandy or gravelly surface layer and a loamy subsoil or a clayey and loamy subsoil

This map unit consists of soils on very gently sloping and gently sloping ridgetops and strongly sloping to moderately steep side slopes. Slopes range from 1 to 5 percent on the ridgetops and from 5 to 30 percent on the side slopes.

This map unit makes up about 7 percent of the parish. It is about 50 percent McLaurin soils, 18 percent Briley soils, 14 percent Darley soils, and 18 percent soils of minor extent.

The McLaurin soils are on very gently sloping ridgetops. They have a surface layer of dark brown loamy fine sand. The next layer is yellowish brown loamy fine sand. The subsoil is red loam in the upper part, red sandy loam in the next part, and yellowish red sandy loam and sandy clay loam in the lower part.

The Briley soils are on gently sloping ridgetops. They have a surface layer of dark brown loamy fine sand. The subsurface layer is brown and yellowish brown loamy fine sand. The subsoil is yellowish red sandy clay loam in the upper part and strong brown, mottled sandy clay loam in the lower part.

The Darley soils are gently sloping, strongly sloping, and moderately steep. They are on ridgetops and side slopes. They have a surface layer of dark brown or reddish brown gravelly fine sandy loam. The subsurface layer is yellowish red gravelly fine sandy loam. The subsoil is red and yellowish red sandy clay in the upper part, red clay in the next part, and yellowish red sandy clay loam in the lower part. The middle part of the subsoil is interlayered with ironstone.

Of minor extent in this map unit are Betis, Mahan, and Sacul soils. Betis and Mahan soils are on ridgetops and the upper side slopes. Sacul soils are on some of the ridgetops and on the lower side slopes.

Most areas of this map unit are used as woodland. A small acreage is used as pasture or cropland.

The soils in this map unit generally are well suited to woodland. The Briley soils and the moderately steep Darley soils are moderately well suited to this use. Seedling mortality is moderate in areas of the Briley soils because of droughtiness. Erosion is a hazard in areas of the moderately steep Darley soils.

The soils in this map unit generally are moderately well suited to cropland. The strongly sloping and moderately steep Darley soils generally are not suited to crops. Erosion is a hazard on the steeper slopes. Low or medium fertility, potential aluminum toxicity, and the droughtiness also are concerns. Special conservation practices are needed to control erosion.

The McLaurin soils are well suited to pasture. The Briley soils and the gently sloping and strongly sloping Darley soils are moderately well suited to this use. The slope, the droughtiness, the low or medium fertility, and small stones on the surface are the main limitations. The moderately steep Darley soils are poorly suited to pasture because of the slope and a severe hazard of erosion.

The soils in this map unit generally are moderately well suited to urban development and intensive recreational uses. The moderately steep Darley soils are poorly suited to most of these uses. The slope is the main limitation affecting building site development, and seepage is a problem on sites for sanitary facilities. Cutbanks cave easily in areas of the sandier McLaurin and Briley soils. In areas of the Darley soils, the ironstone layers in the subsoil and the small stones on the surface are additional limitations. The sandy surface layer and droughtiness in the Briley soils are limitations affecting most recreational uses.

8. Sacul-Darley

Gently sloping to moderately steep, moderately well drained and well drained soils that have a loamy or gravelly surface layer and a clayey and loamy subsoil

This map unit consists of soils on gently sloping ridgetops and strongly sloping or moderately steep side slopes. These soils are mainly in the northwestern part of the parish. Slopes range from 1 to 5 percent on the ridgetops and from 5 to 30 percent on the side slopes.

This map unit makes up about 35 percent of the

parish. It is about 42 percent Sacul soils, 26 percent Darley soils, and 32 percent soils of minor extent.

The Sacul soils are moderately well drained. They have a surface layer of dark brown or dark grayish brown very fine sandy loam. The subsurface layer is yellowish brown very fine sandy loam. The subsoil is yellowish red silty clay in the upper part; red, mottled clay in the next part; and gray, mottled silty clay loam in the lower part.

The Darley soils are well drained. They have a surface layer of dark brown or reddish brown gravelly fine sandy loam. The subsurface layer is yellowish red gravelly fine sandy loam. The subsoil is yellowish red and red sandy clay in the upper part, red clay in the next part, and yellowish red sandy clay loam in the lower part. The middle part of the subsoil is interlayered with ironstone.

Of minor extent in this map unit are Darbonne and Mahan soils on some of the side slopes and ridgetops.

Most areas of this map unit are used as woodland. A small acreage is used as pasture or cropland.

The soils in this map unit generally are moderately well suited to woodland. The gently sloping and strongly sloping Darley soils are well suited to this use. Erosion is a hazard in moderately steep areas. Rutting and compaction are problems if heavy equipment is used when the soils are moist.

The gently sloping Sacul soils are poorly suited to crops because of the slope and a severe hazard of erosion. The gently sloping Darley soils are moderately well suited to this use. The strongly sloping and moderately steep Sacul and Darley soils generally are not suited to crops. Droughtiness, low or medium fertility, and potential aluminum toxicity in the root zone are additional limitations.

The soils in this map unit generally are moderately well suited to pasture. The moderately steep soils are poorly suited to this use. The slope, the low or medium fertility, and the droughtiness are limitations. Conservation practices are needed to control erosion until pasture grasses are established.

The Sacul soils generally are poorly suited to urban development and moderately well suited to intensive recreational uses. The Darley soils generally are moderately well suited to these uses. The moderately steep soils are poorly suited to these uses. The slope, slow or moderately slow permeability, a high shrink-swell potential, wetness, and low strength on sites for roads are the main limitations. In areas of the Darley soils, the ironstone layers are an additional limitation.

Detailed Soil Map Units

The map units on the detailed soil maps at the back of this survey represent the soils in the survey area. The map unit descriptions in this section, along with the soil maps, can be used to determine the suitability and potential of a soil for specific uses. They also can be used to plan the management needed for those uses. More information on each map unit, or soil, is given under the heading "Use and Management of the Soils."

Each map unit on the detailed soil maps represents an area on the landscape and consists of one or more soils for which the unit is named.

A symbol identifying the soil precedes the map unit name in the soil descriptions. Each description includes general facts about the soil and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the underlying material, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Darley gravelly fine sandy loam, 1 to 5 percent slopes, is a phase of the Darley series.

Some map units are made up of two or more major soils. These map units are called soil complexes or soil associations.

A *soil complex* consists of two or more soils in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Guyton-Ouachita silt loams, frequently flooded, is an example.

A *soil association* is made up of two or more geographically associated soils that are shown as one unit on the maps. Because of present or anticipated soil uses in the survey area, it was not considered practical or necessary to map the soils separately. The pattern and relative proportion of the soils are somewhat similar. Darley-Sacul association, 12 to 30 percent slopes, is an example.

Most map units include small scattered areas of soils other than those for which the map unit is named. Some of these included soils have properties that differ substantially from those of the major soil or soils. Such differences could significantly affect use and management of the soils in the map unit. The included soils are identified in each map unit description.

Table 5 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils.

The boundaries of map units in Lincoln Parish were matched, where possible, with those of the previously published surveys of Claiborne and Ouachita Parishes, Louisiana. In a few places, however, the names of the map units differ. This difference resulted mainly from changes in soil series concepts, in map unit design, and in soil patterns near survey area boundaries.

All of the soils in Lincoln Parish were mapped at the same level of detail, except for those soils in strongly sloping to steep areas and those that are frequently flooded. The strongly sloping to steep soils are in woodland, where the land use is not likely to change. In areas where frequent flooding limits the use and management of the soils, separating soils in mapping is of little value to the land user.

AnB—Angie very fine sandy loam, 1 to 3 percent slopes. This very gently sloping, moderately well drained soil is on broad ridgetops in the uplands. Areas are irregular in shape and range from about 10 to 350 acres in size.

Typically, the surface layer is dark yellowish brown very fine sandy loam about 6 inches thick. The subsurface layer is yellowish brown very fine sandy loam about 6 inches thick. The upper part of the

subsoil, to a depth of about 25 inches, is strong brown silty clay loam. The next part, to a depth of about 57 inches, is yellowish brown, mottled silty clay. The lower part, to a depth of about 70 inches, is light brownish gray, mottled silty clay.

This soil is characterized by low fertility and high levels of exchangeable aluminum that are potentially toxic to crops. Water and air move through the soil at a slow rate. Water runs off the surface at a medium rate. The seasonal high water table is at a depth of about 3 to 5 feet from December through April. The available water capacity is high or very high. The shrink-swell potential is high.

Included with this soil in mapping are a few small areas of Bowie and Sacul soils. Bowie soils are at the slightly higher elevations. They are loamy throughout. Sacul soils are on side slopes at the lower elevations. They have a content of clay in the subsoil that decreases with increasing depth. Included soils make up about 10 percent of the map unit.

Most of the acreage is used as woodland or pasture. A small acreage is used as cropland.

The Angie soil is moderately well suited to loblolly pine, shortleaf pine, white oak, southern red oak, and sweetgum. The main concerns in producing and harvesting timber are an equipment limitation and compaction caused by wetness. Plant competition is an additional concern. Conventional methods of harvesting timber generally can be used, but their use may be limited during rainy periods, generally from December through April. Planting or harvesting trees during dry periods helps to prevent compaction and rutting. Proper site preparation and spraying, cutting, or girdling can eliminate unwanted weeds, brush, or trees.

This soil is moderately well suited to cultivated crops, mainly corn, soybeans, and grain sorghum. It is limited mainly by the hazard of erosion, the wetness, the low fertility, and potentially toxic levels of exchangeable aluminum in the root zone. Properly arranging the crop rows and establishing field ditches and vegetated waterways help to remove excess surface water. Erosion can be controlled by conservation tillage, terraces, diversions, and grassed waterways. Crop residue left on or near the surface helps to maintain tilth and the content of organic matter. Most crops respond well to applications of fertilizer and lime, which help to overcome the low fertility and the high levels of exchangeable aluminum.

This soil is well suited to pasture. The hazard of erosion and the wetness from December through April are the main limitations. The main suitable pasture plants are bahiagrass, common bermudagrass, improved bermudagrass, white clover, vetch, and winterpea. Preparing the seedbed on the contour helps to control erosion until pasture grasses are established. Grazing when the soil is wet results in compaction of the surface layer and damage to the plant community. Fertilizer and lime are needed for optimum growth of grasses and legumes.

This soil is poorly suited to urban development. The wetness, the slow permeability, the clayey subsoil, the high shrink-swell potential, and low strength on sites for roads and streets are the main limitations. Excess water can be removed by shallow ditches and proper grading. The slow permeability and the high water table increase the possibility that septic tank absorption fields will fail. Increasing the size of the septic tank absorption field helps to overcome the slow permeability in the subsoil. Properly designing buildings and roads helps to offset the effects of shrinking and swelling and the limited ability of the soil to support a load.

This soil is moderately well suited to most recreational uses. It is limited mainly by the slow permeability, which increases the wetness of the soil. The slope is a concern on sites for playgrounds. A good drainage system should be provided in intensively used areas, such as playgrounds and camp areas. Maintaining a good plant cover on playgrounds helps to control erosion.

The capability subclass is IIe. The woodland ordination symbol is 9W.

BeC—Betis loamy fine sand, 1 to 5 percent slopes. This gently sloping, somewhat excessively drained soil is on ridgetops in the uplands. Areas range from 10 to 250 acres in size.

Typically, the surface layer is brown loamy fine sand about 8 inches thick. The subsurface layer is light yellowish brown loamy fine sand about 14 inches thick. The subsoil extends to a depth of about 47 inches. It is strong brown loamy fine sand. Below this to a depth of about 76 inches is pale brown fine sand and yellowish red loamy fine sand.

This soil is characterized by low fertility and moderately high levels of exchangeable aluminum that are potentially toxic to crops. Water and air move through the soil at a rapid rate. Water runs off the surface at a very slow rate. This soil dries quickly after rains. The available water capacity is low or moderate. The shrink-swell potential is low.

Included with this soil in mapping are a few small areas of Briley, McLaurin, and Trep soils. These soils are at the slightly lower elevations. They have a sandy surface layer and a loamy subsoil. They make up about 10 percent of the map unit.

Most of the acreage is used as woodland. A small acreage is used as pasture.

The Betis soil is moderately well suited to loblolly

pine, shortleaf pine, post oak, and sweetgum. When the surface layer is dry, traction is poor. Seedling mortality is generally high because of droughtiness. Seedlings should be planted in early spring so that they can obtain sufficient moisture from spring rains. Restricting burning and leaving slash well distributed help to maintain the content of organic matter.

This soil is moderately well suited to crops and pasture. The low fertility, the potentially toxic levels of exchangeable aluminum, a limited choice of plants, and the droughtiness are limitations. The soil is well suited to specialty crops, such as watermelons and peanuts. Suitable pasture plants include improved bermudagrass, bahiagrass, weeping lovegrass, and crimson clover. This soil is friable and can be easily kept in good tilth. It can be easily worked when moist, but traction is poor when the surface layer is dry. Proper management of crop residue helps to maintain the content of organic matter, improves tilth, and conserves moisture. The response to fertilizer is fair. Lime is generally needed.

This soil is moderately well suited to urban uses. It has slight limitations affecting sites for dwellings and local roads and streets and severe limitations affecting sites for most sanitary facilities. Cutbanks are subject to caving where shallow excavations are made. Seepage is too excessive for most sanitary facilities. If the density of housing is moderate or high, community sewage systems are needed to prevent the contamination of water supplies by seepage. Mulching, applying fertilizer, and irrigating help to establish lawn grasses and other small-seeded plants.

This soil is moderately well suited to intensive recreational uses. When the surface layer is dry, traction is poor. The slope is an additional limitation on playgrounds. Irrigation is generally needed for golf fairways and for other areas that support landscaping plants and lawn grasses. Maintaining an adequate plant cover in intensively used areas, such as playgrounds, helps to control erosion.

The capability subclass is IIIs. The woodland ordination symbol is 7S.

BEE—Betis loamy fine sand, 5 to 12 percent slopes. This strongly sloping, somewhat excessively drained soil is on side slopes in the uplands. Areas range from about 10 to 250 acres in size. Because of the slope, the number of observations was fewer in areas of this soil than in other areas of the parish. The detail in mapping, however, is adequate for the expected use of the soil.

Typically, the surface layer is dark grayish brown loamy fine sand about 5 inches thick. The subsurface layer is brown loamy fine sand about 18 inches thick. The subsoil to a depth of about 62 inches is loamy fine sand. It is yellowish red in the upper part and pale brown and yellowish red in the lower part.

This soil is characterized by low fertility and moderately high levels of exchangeable aluminum that are potentially toxic to crops. Water and air move through the soil at a rapid rate. Water runs off the surface at a very slow rate. This soil dries quickly after rains. The seasonal high water table is at a depth of more than 6 feet. The available water capacity is low or moderate. The shrink-swell potential is low.

Included with this soil in mapping are a few small areas of Briley, McLaurin, and Trep soils. These soils are at the slightly lower elevations. They have a sandy surface layer and a loamy subsoil. They make up about 10 percent of the map unit.

Most of the acreage is used as woodland. A small acreage is used as pasture.

The Betis soil is moderately well suited to loblolly pine, shortleaf pine, post oak, and sweetgum. When the surface layer is dry, traction is poor. Seedling mortality is generally high because of droughtiness. Seedlings should be planted in early spring so that they can obtain sufficient moisture from spring rains. Restricting burning and leaving slash well distributed help to maintain the content of organic matter.

This soil is generally not suited to crops because of a severe hazard of erosion. It is poorly suited to pasture. The hazard of erosion, the low fertility, a limited choice of plants, the potentially toxic levels of exchangeable aluminum, and the droughtiness are limitations. The main suitable pasture plants are improved bermudagrass, bahiagrass, weeping lovegrass, and crimson clover. Additions of fertilizer and lime are needed. Preparing seedbeds on the contour helps to control erosion until pasture grasses are established.

This soil is moderately well suited to urban uses. The slope is a moderate limitation on sites for dwellings and local roads and streets, and seepage is a severe hazard on sites for most sanitary facilities. Cutbanks are subject to caving where shallow excavations are made. Disturbed areas on construction sites can be protected against erosion by revegetating as soon as possible. If irrigation is not provided, species that can tolerate the droughtiness should be selected for planting.

Mainly because of the slope and the sandy surface layer, this soil is only moderately well suited to intensive recreational uses. When the sandy surface layer is dry and loose, traction is poor. Erosion and sedimentation can be controlled and the beauty of the area enhanced by maintaining an adequate plant cover. The plant cover can be maintained by irrigating, adding fertilizer, and controlling traffic.

The capability subclass is VIe. The woodland ordination symbol is 7S.

BoC—Bowie fine sandy loam, 1 to 5 percent slopes. This gently sloping, moderately well drained soil is on narrow or broad, slightly convex ridgetops in the uplands. Areas range from about 20 to 200 acres in size.

Typically, the surface layer is dark brown fine sandy loam about 7 inches thick. The subsurface layer is yellowish brown fine sandy loam about 6 inches thick. The subsoil to a depth of about 85 inches is sandy clay loam. The upper 14 inches of the subsoil is strong brown, and the next part is yellowish brown and mottled. The next part, to a depth of about 67 inches, is yellowish brown and mottled and gray. The lower 18 inches is mottled yellowish brown, red, and gray.

This soil is characterized by low fertility and moderately high levels of exchangeable aluminum that are potentially toxic to crops. A perched water table is at a depth of 3.5 to 5.0 feet during late winter and early spring of most years. Water and air move through the soil at a moderately slow rate. Water runs off the surface at a medium rate. The available water capacity is moderate to very high. The shrink-swell potential is low in the upper part of the soil and moderate in the lower part.

Included with this soil in mapping are a few small areas of Angie, Briley, Sacul, and Trep soils. Angie and Sacul soils are at the slightly lower elevations. They have a loamy and clayey subsoil. Briley and Trep soils have a sandy surface layer and subsurface layer. Briley soils are at the slightly higher elevations. Trep soils are in landscape positions similar to those of the Bowie soil. Included soils make up about 15 percent of the map unit.

Most of the acreage is used as woodland. A small acreage is used as pasture or cropland.

The Bowie soil is well suited to loblolly pine, shortleaf pine, southern red oak, and sweetgum. Few limitations significantly affect timber production. If site preparation is not adequate, however, competition from undesirable plants can delay the reestablishment of trees. Prescribed burning and chemical treatments help to control unwanted vegetation.

This soil is moderately well suited to crops, but it erodes easily in areas not covered by vegetation. The low fertility and the potentially toxic levels of exchangeable aluminum in the root zone are additional limitations. This soil is friable and can be easily kept in good tilth. It can be cultivated throughout a wide range in moisture content. Managing crop residue, stripcropping, farming on the contour, and establishing terraces help to control erosion. Most crops respond well to applications of lime and fertilizer, which help to overcome the low fertility and the moderately high levels of exchangeable aluminum.

This soil is well suited to pasture. The slope and the low fertility are the main limitations. Suitable pasture plants are common bermudagrass, improved bermudagrass, bahiagrass, ryegrass, and crimson clover. Preparing seedbeds on the contour or across the slope helps to control erosion. Fertilizer and lime are needed for optimum production of forage.

This soil is moderately well suited to urban uses. It has slight limitations affecting sites for dwellings, moderate limitations affecting sites for local roads and streets, and moderate or severe limitations affecting sites for most sanitary facilities. The wetness and the moderately slow permeability in the subsoil are limitations on sites for septic tank absorption fields. Enlarging the size of the absorption field can overcome the moderately slow permeability. Excess water can be removed by providing shallow ditches, proper grading, and installing drainage tile around the footings of buildings. Properly designing roads and streets helps to offset the limited ability of the soil to support a load. Erosion is a hazard in the steeper areas. Vegetation in construction areas should be disturbed as little as possible.

This soil is well suited to intensive recreational uses. The slope is a moderate limitation on playgrounds. Erosion can be controlled by maintaining an adequate plant cover.

The capability subclass is IIIe. The woodland ordination symbol is 9A.

BoD—Bowie fine sandy loam, 5 to 8 percent slopes. This moderately sloping, moderately well drained soil is on short irregular side slopes in the uplands. Areas range from about 20 to 300 acres in size.

Typically, the surface layer is brown fine sandy loam about 5 inches thick. The subsurface layer is light yellowish brown fine sandy loam about 3 inches thick. The subsoil extends to a depth of about 75 inches. The upper part is strong brown sandy clay loam about 27 inches thick. The next part is yellowish brown, mottled sandy clay loam about 28 inches thick. The lower part is mottled light brownish gray, red, and yellowish brown clay loam about 12 inches thick.

This soil is characterized by low fertility and moderately high levels of exchangeable aluminum that are potentially toxic to most crops. A perched water table is at a depth of 3.5 to 5.0 feet during late winter and early spring. Water and air move through the soil at a moderately slow rate. Water runs off the surface at a medium rate. The available water capacity is moderate to very high. The shrink-swell potential is low in the upper part of the soil and moderate in the lower part.

Included with this soil in mapping are a few small

areas of Angie and Sacul soils. These soils are at the slightly lower elevations. They have a loamy and clayey subsoil. They make up about 15 percent of the map unit.

Most of the acreage is used as woodland. A small acreage is used as pasture.

The Bowie soil is well suited to loblolly pine, shortleaf pine, southern red oak, and sweetgum. Few limitations significantly affect timber production, but competition from understory plants is moderate. Proper site preparation and spraying, cutting, or girdling can eliminate unwanted weeds, brush, or trees.

Mainly because of the slope and a severe hazard of erosion, this soil is poorly suited to crops. The low fertility and the potentially toxic levels of exchangeable aluminum in the root zone are additional limitations. This soil is friable and can be easily kept in good tilth. It can be cultivated throughout a wide range in moisture content. Managing crop residue, stripcropping, farming on the contour, and establishing terraces helps to control erosion. Most crops respond well to applications of lime and fertilizer, which help to overcome the low fertility and the moderately high levels of exchangeable aluminum.

This soil is moderately suited to pasture. The main hazard is erosion. The low fertility is the main limitation. The main suitable pasture plants are common bermudagrass, improved bermudagrass, bahiagrass, ryegrass, and crimson clover. Preparing seedbeds on the contour or across the slope where practical helps to control erosion. Fertilizer and lime are needed for optimum production of forage.

This soil is moderately well suited to urban uses. It has slight limitations affecting sites for dwellings, moderate limitations affecting sites for local roads and streets, and moderate or severe limitations affecting sites for most sanitary facilities. The wetness and the moderately slow permeability are limitations on sites for septic tank absorption fields. The moderately slow permeability can be overcome by enlarging the size of the absorption field. Because the seasonal high water table is perched above the subsoil, drainage should be provided on sites for buildings or septic tank absorption fields. Properly designing roads helps to offset the limited ability of the soil to support a load. Erosion is a hazard. Vegetation in construction areas should be disturbed as little as possible.

This soil is well suited to intensive recreational uses, but the slope is a moderate limitation on playgrounds. Erosion and sedimentation can be controlled by maintaining an adequate plant cover.

The capability subclass is IVe. The woodland ordination symbol is 9A.

BrC—Briley loamy fine sand, 1 to 5 percent slopes. This gently sloping, well drained soil is on convex ridgetops in the uplands. Areas range from about 10 to 250 acres in size.

Typically, the surface layer is dark brown loamy fine sand about 7 inches thick. The subsurface layer is loamy fine sand about 20 inches thick. It is brown in the upper part and yellowish brown in the lower part. The subsoil to a depth of about 85 inches is sandy clay loam. The upper 40 inches is yellowish red. The lower part is strong brown and mottled.

This soil is characterized by low fertility and moderately high levels of exchangeable aluminum that are potentially toxic to crops. Water and air move through the surface layer and subsurface layer at a rapid rate and through the subsoil at a moderate rate. Water runs off the surface at a slow rate. This soil dries quickly. The available water capacity is moderate. The seasonal high water table is at a depth of more than 6 feet. The shrink-swell potential is low.

Included with this soil in mapping are a few small areas of Bowie, McLaurin, and Trep soils. These soils are at the slightly lower elevations. Bowie soils are loamy throughout. McLaurin soils have a sandy surface layer and subsurface layer that have a combined thickness of less than 20 inches. Trep soils have a subsoil that is mainly yellowish brown. Included soils make up about 15 percent of the map unit.

Most of the acreage is used as woodland. A small acreage is used as pasture or cropland.

The Briley soil is moderately well suited to loblolly pine, shortleaf pine, post oak, and sweetgum. Seedling mortality is generally moderate because of droughtiness. Seedlings should be planted in early spring so that they can obtain sufficient moisture from spring rains.

This soil is moderately well suited to crops, mainly corn, grain sorghum, watermelons, and other vegetables. Erosion is the main hazard. The droughtiness limits the choice of crops. This soil is friable and can be easily kept in good tilth. It can be easily worked when moist, but traction is poor when the soil is dry. Returning all crop residue to the surface layer helps to conserve moisture, improves fertility and the content of organic matter, and helps to control erosion. Terraces help to control runoff and erosion and conserve moisture. Crops respond well to additions of fertilizer and lime, which help to overcome the low fertility and the moderately high levels of exchangeable aluminum in the root zone.

This soil is moderately well suited to pasture. The slope, the low fertility, and the droughtiness are the main limitations. The main suitable pasture plants are improved bermudagrass, bahiagrass, and crimson

clover. Preparing seedbeds on the contour or across the slope helps to control erosion. Fertilizer and lime are needed for optimum production of forage.

This soil is moderately well suited to urban uses. It has slight limitations affecting sites for dwellings and local roads and streets and slight to severe limitations affecting sites for sanitary facilities. Seepage is a problem on sites for sanitary facilities. Cutbanks cave in easily where shallow excavations are made. Preserving the existing plant cover during construction helps to control erosion. Because the soil is somewhat droughty, irrigation is needed to establish and maintain most lawn grasses and ornamental trees and shrubs.

This soil is moderately well suited to intensive recreational uses. When the sandy surface layer is dry and loose, traction is poor. The slope is a limitation on playgrounds. The hazard of erosion can be reduced by maintaining an adequate plant cover. Irrigation helps to maintain a good plant cover.

The capability subclass is IIIe. The woodland ordination symbol is 8S.

ChB—Cahaba fine sandy loam, 1 to 3 percent slopes. This very gently sloping, well drained soil is on stream terraces. Areas range from about 20 to 200 acres in size.

Typically, the surface layer is dark brown fine sandy loam about 8 inches thick. The next layer is yellowish brown and yellowish red fine sandy loam about 7 inches thick. The subsoil extends to a depth of about 48 inches. It is sandy clay loam. It is yellowish red in the upper part, red in the next part, and yellowish red in the lower part. The substratum to a depth of about 73 inches is loamy sand. It is yellowish brown and mottled in the upper part and strong brown in the lower part.

This soil is characterized by low fertility. Water and air move through the upper part of the soil at a moderate rate and through the lower part at a moderately rapid or rapid rate. Water runs off the surface at a medium rate. The seasonal high water table is at a depth of more than 6 feet. The available water capacity is moderate or high. The shrink-swell potential is low.

Included with this soil in mapping are a few small areas of Dela, Dubach, Guyton, Iuka, and Ouachita soils. Dela, Guyton, Iuka, and Ouachita soils are on flood plains. Dela and Iuka soils do not have a distinct subsoil. Dubach soils are in landscape positions similar to those of the Cahaba soil. They have a yellowish brown and strong brown subsoil. Guyton soils are poorly drained. They are grayish throughout. Ouachita soils have a brownish subsoil that has less clay and sand than the subsoil of the Cahaba soil. Included soils make up about 15 percent of the map unit.

Most of the acreage is used as woodland. A few areas are used as cropland or pasture.

The Cahaba soil is well suited to loblolly pine, shortleaf pine, yellow-poplar, sweetgum, southern red oak, and water oak. Few limitations affect woodland management. If site preparation is not adequate, however, competition from undesirable plants can delay the reestablishment of trees.

This soil is well suited to crops, mainly grain sorghum, soybeans, corn, and vegetables. It is limited mainly by the low fertility. The hazard of erosion is moderate. It can be reduced by minimizing tillage and establishing terraces, diversions, and grassed waterways. The content of organic matter can be maintained by a suitable cropping system. Most crops respond well to additions of lime and fertilizer.

This soil is well suited to pasture. The main limitation is the low fertility. Erosion is a hazard in tilled areas until pasture grasses are established. The main suitable pasture plants are improved bermudagrass, common bermudagrass, bahiagrass, ryegrass, ball clover, and crimson clover. Proper grazing practices, weed control, and fertilizer are needed for the maximum quality of forage. Preparing seedbeds on the contour or across the slope helps to control erosion.

This soil is well suited to building site development, local roads and streets, and septic tank absorption fields. Few limitations affect these uses. Cutbanks cave in easily where shallow excavations are made. Seepage is a problem, and ground water can be contaminated in areas used for sewage lagoons or sanitary landfills. Revegetating disturbed areas on construction sites as soon as possible helps to control erosion.

This soil is well suited to recreational development. Few limitations affect most intensive recreational uses. Erosion is a hazard on playgrounds. It can be controlled by maintaining a good plant cover.

The capability subclass is IIe. The woodland ordination symbol is 9A.

DbC—Darbonne loamy fine sand, 1 to 5 percent slopes. This gently sloping, well drained soil is on ridgetops in the uplands. Areas are irregular in shape and range from about 20 to 200 acres in size.

Typically, the surface layer is dark grayish brown loamy fine sand about 5 inches thick. The next 7 inches is yellowish red loamy fine sand. The upper part of the subsoil is red fine sandy loam. The next part, to a depth of about 42 inches, is red gravelly sandy clay loam. The lower part, to a depth of about 65 inches, is yellowish red sandy clay loam and yellowish brown fine sandy loam. Fragments of ironstone are throughout the subsoil.

This soil is characterized by low fertility. Water and

air move through the soil at a moderately slow rate. The large amount of small to large fragments of ironstone in the subsoil reduces the available water capacity. The available water capacity is low or moderate. The seasonal high water table is at a depth of more than 6 feet. Water runs off the surface at a medium rate. This soil dries quickly after rains. The shrink-swell potential is low in the subsoil.

Included with this soil in mapping are a few small areas of Darley and Mahan soils. These soils are on ridgetops in landscape positions similar to those of the Darbonne soil and on side slopes. They have a loamy and clayey subsoil. Darley soils have a subsoil that contains ironstone layers. Included soils make up about 15 percent of the map unit.

Most of the acreage is used as woodland. A few areas are used as pasture or cropland.

The Darbonne soil is well suited to loblolly pine, shortleaf pine, hickory, southern red oak, white oak, and sweetgum. Few limitations affect timber production, but windthrow is common because roots are restricted by the fragments of ironstone. Competition from undesirable understory plants is moderate. Tree growth is somewhat limited by droughtiness and the fragments of ironstone. Proper site preparation helps to control initial plant competition, and spraying helps to control subsequent growth.

This soil is moderately well suited to cultivated crops. The low fertility and the droughtiness are the main limitations. Erosion is a moderate hazard. This soil is friable and can be easily kept in good tilth. It can be worked throughout a wide range in moisture content. Cotton, corn, and wheat are the main crops. Small peach orchards also are common in many areas. Crop residue left on or near the surface helps to control runoff and maintain tilth and the content of organic matter. Crops respond well to applications of lime and fertilizer. Conservation tillage, terraces, diversions, and grassed waterways help to control erosion.

This soil is moderately well suited to pasture. The main limitations are the slope, the low fertility, and the droughtiness. Erosion is a hazard in tilled areas until pasture grasses are established. The main suitable pasture plants are common bermudagrass, improved bermudagrass, bahiagrass, ball clover, crimson clover, and ryegrass. Seedbeds should be prepared on the contour or across the slope where practical. Grasses and legumes grow well if adequate fertilizer is applied. Rotation grazing helps to maintain the quality of forage.

This soil is well suited to urban development. It has slight limitations affecting sites for buildings and local roads and streets. The hazard of erosion is increased if the soil is left exposed during site development. This soil has severe limitations affecting sites for sanitary facilities because of the moderately slow permeability and seepage. Increasing the size of the septic tank absorption field helps to overcome the moderately slow permeability. The bottom of sewage lagoons should be sealed to prevent the seepage of effluent and the contamination of ground water. Digging shallow excavations is difficult because of the fragments of ironstone and the hard substratum.

This soil is moderately well suited to recreational uses. The main limitation is small stones on the surface. The slope is an additional limitation on playgrounds. A good plant cover helps to control erosion. It can be maintained by adding fertilizer and controlling traffic. Because the soil is somewhat droughty, irrigation is needed to maintain grasses on golf fairways.

The capability subclass is IIIe. The woodland ordination symbol is 8F.

DrC—Darley gravelly fine sandy loam, 1 to 5 percent slopes. This gently sloping, well drained soil is on ridgetops in the uplands. Areas are irregular in shape and range from 20 to 300 acres in size.

Typically, the surface layer is dark brown gravelly fine sandy loam about 6 inches thick. The subsurface layer is yellowish red gravelly fine sandy loam about 5 inches thick. The upper part of the subsoil is yellowish red sandy clay. The next part, to a depth of about 29 inches, is red sandy clay. The next 24 inches consists of alternating layers of red clay and fractured layers of ironstone. The lower part to a depth of about 85 inches is yellowish red sandy clay loam.

This soil is characterized by medium fertility and high levels of exchangeable aluminum that are potentially toxic to crops. Permeability is moderately slow. In places the large amount of fragments of ironstone in the surface layer and subsoil reduce the available water capacity. The available water capacity is low to high. Water runs off the surface at a medium rate. The seasonal high water table is at a depth of more than 6 feet. The shrink-swell potential is low.

Included with this soil in mapping are a few small areas of Darbonne, Mahan, and Sacul soils. Darbonne and Mahan soils are on ridgetops in landscape positions similar to those of the Darbonne soil. Mahan soils are also on side slopes. Mahan and Sacul soils do not have ironstone layers in the subsoil. Included soils make up about 15 percent of the map unit.

Most of the acreage is used as woodland. A few areas are used as pasture or cropland.

The Darley soil is well suited to loblolly pine, shortleaf pine, hickory, southern red oak, sweetgum, and white oak. The main concerns in producing and harvesting timber are plant competition and windthrow.

The layers and fragments of ironstone can limit the growth of tree roots and increase the hazard of windthrow. Droughtiness can somewhat limit tree growth. Competing vegetation can be controlled by proper site preparation.

This soil is moderately well suited to cultivated crops. It is limited mainly by the medium fertility, the droughtiness, and the potentially toxic levels of exchangeable aluminum in the root zone. The hazard of erosion is moderate. The main suitable crops are corn and grain sorghum. Peaches also are grown in many places. This soil is friable and can be easily kept in good tilth. It can be worked throughout a wide range in moisture content. Where coarse fragments are concentrated on the surface, however, seedbed preparation can be difficult and seed germination hindered. Sprinkler systems are suitable irrigation methods on this soil. Crop residue left on or near the surface helps to conserve moisture, maintains tilth, and helps to control erosion. Terraces help to control runoff and erosion and help to conserve moisture. Most crops respond well to additions of fertilizer and lime, which help to overcome the medium fertility and the levels of exchangeable aluminum in the root zone.

This soil is moderately well suited to pasture. The droughtiness and the medium fertility are the main limitations. The main suitable pasture plants are common bermudagrass, improved bermudagrass, crimson clover, tall fescue, bahiagrass, and ryegrass. Seedbeds should be prepared on the contour or across the slope where practical. Fertilizer and lime are needed for optimum production of forage. Periodic mowing and clipping help to maintain uniform plant growth and help to prevent selective grazing.

This soil is moderately well suited to urban development. It has slight limitations affecting building sites and moderate or severe limitations affecting sites for most sanitary facilities. The main limitations are the moderately slow permeability, the ironstone layers, and low strength on sites for roads. Erosion is the main hazard. Digging shallow excavations is difficult because of the ironstone layers in the subsoil. Revegetating disturbed areas on construction sites as soon as possible helps to control erosion. Establishing plants is difficult in areas where the surface layer has been removed, exposing the clayey subsoil and the ironstone layers. Mulching and applying fertilizer in cut areas help to establish plants. The bottom of lagoons should be sealed to prevent the seepage of effluent. Septic tank absorption lines may not function properly during rainy periods because of the moderately slow permeability. Increasing the size of the septic tank absorption field helps to overcome the moderately slow permeability.

This soil is moderately well suited to recreational uses. The main limitation is small stones on or in the surface layer. Seeding or mulching cuts and fills helps to prevent excessive erosion. A plant cover can be maintained by adding fertilizer and controlling traffic. Because the soil is somewhat droughty, irrigation is needed to maintain grasses on golf fairways.

The capability subclass is IIIe. The woodland ordination symbol is 8F.

DRE—Darley gravelly fine sandy loam, 5 to 12 percent slopes. This strongly sloping, well drained soil is on side slopes in the uplands. Areas are irregular in shape and range from 30 to 250 acres in size. The number of observations was fewer in areas of this soil than in other areas of the parish. The detail in mapping, however, is adequate for the expected use of the soil.

Typically, the surface layer is reddish brown gravelly fine sandy loam about 5 inches thick. The subsurface layer is yellowish red gravelly fine sandy loam about 7 inches thick. The subsoil extends to a depth of about 50 inches. It is red sandy clay in the upper part and alternating layers of ironstone and yellowish red clay in the lower part. Below this to a depth of about 65 inches is strong brown fine sandy loam.

This soil is characterized by medium fertility and high levels of exchangeable aluminum that are potentially toxic to crops. Permeability is moderately slow. The available water capacity is low to high. The seasonal high water table is at a depth of more than 6 feet. Water runs off the surface at a rapid rate, and the hazard of erosion is severe. The shrink-swell potential is low.

Included with this soil in mapping are a few small areas of Mahan and Sacul soils. These soils are on the lower side slopes. They do not have continuous layers of ironstone in the subsoil. Sacul soils have gray mottles in the upper part of the subsoil. Included soils make up about 15 percent of the map unit.

Most of the acreage is used as woodland. A few areas are used as pasture.

The Darley soil is well suited to loblolly pine, shortleaf pine, hickory, southern red oak, white oak, and sweetgum. Plant competition is moderate, and droughtiness can somewhat limit tree growth. Competing vegetation can be controlled by proper site preparation. The ironstone layers in the subsoil restrict the growth of tree roots and increase the hazard of windthrow.

Because of the slope and the severe hazard of erosion, this soil is generally not suited to cultivated crops. If the soil is adequately protected against erosion, however, close-sown crops, such as wheat, can be grown in the less steeply sloping areas. In places stones on the surface may somewhat hinder the

use of equipment. The medium fertility and the potentially toxic levels of exchangeable aluminum in the root zone are additional limitations. This soil is friable and can be easily kept in good tilth. It can be worked throughout a wide range in moisture content. Where coarse fragments are concentrated on the surface, however, seedbed preparation can be difficult and seed germination hindered. Crop residue left on or near the surface helps to control runoff and maintain tilth and the content of organic matter. Crops respond well to additions of lime and fertilizer, which help to overcome the medium fertility and the high levels of exchangeable aluminum.

This soil is moderately well suited to pasture. The main limitations are the hazard of erosion, the droughtiness, and the medium fertility. In places stones on the surface somewhat limit the use of equipment. The main suitable pasture plants are common bermudagrass, improved bermudagrass, bahiagrass, tall fescue, ryegrass, and crimson clover. Proper grazing practices, weed control, and fertilizer are needed for the maximum quality of forage.

This soil is moderately well suited to urban development. It has slight or moderate limitations affecting sites for dwellings and moderate or severe limitations affecting sites for most sanitary facilities. The main limitations are the moderately slow permeability, the slope, low strength on sites for roads and streets, and the ironstone layers. Erosion is a hazard in disturbed areas. Vegetation in construction areas should be disturbed as little as possible. Establishing plants is difficult in areas where the surface layer has been removed, exposing the clayey subsoil and ironstone layers. Mulching and applying fertilizer in cut areas help to establish plants. Digging shallow excavations is difficult because of the ironstone layers in the subsoil. The effluent from septic tank absorption fields can surface in downslope areas and create a hazard to health. Increasing the size of the septic tank absorption field helps to overcome the moderately slow permeability. Installing absorption fields on the contour helps to prevent the effluent from surfacing in downslope areas. Properly designing roads and streets helps to overcome the limited capacity of the soil to support a load.

This soil is moderately well suited to recreational development. Small stones on the surface are a limitation affecting most recreational uses. The slope is an additional limitation on playgrounds. Seeding or mulching cuts and fills helps to control erosion. A plant cover can be maintained by adding fertilizer and controlling traffic. Because the soil is somewhat droughty, irrigation is needed to maintain grasses on golf fairways.

The capability subclass is VIe. The woodland ordination symbol is 8F.

DRF—Darley-Sacul association, 12 to 30 percent slopes. These moderately steep soils are on side slopes in the uplands. The well drained Darley soil is mainly on the upper part of slopes, and the moderately well drained Sacul soil is on the lower part. Slopes are short and irregular. Areas range from 40 to 300 acres in size. They are about 45 percent Darley soil and 40 percent Sacul soil. Because of the slope, the number of observations was fewer in areas of this map unit than in other areas of the parish. The detail in mapping, however, is adequate for the expected use of the soils.

Typically, the Darley soil has a surface layer of reddish brown gravelly fine sandy loam about 4 inches thick. The subsurface layer is yellowish red gravelly fine sandy loam about 4 inches thick. The subsoil extends to a depth of about 60 inches. It is yellowish red sandy clay in the upper part, alternating layers of ironstone and yellowish red sandy clay in the next part, and strong brown fine sandy loam in the lower part.

The Darley soil is characterized by low fertility and high levels of exchangeable aluminum that are potentially toxic to crops. Water and air move through the soil at a moderately slow rate. The available water capacity is low to high. The seasonal high water table is at a depth of more than 6 feet. Water runs off the surface at a rapid rate. This soil dries quickly after rains. The shrink-swell potential is low.

Typically, the Sacul soil has a surface layer of dark brown very fine sandy loam about 3 inches thick. The subsurface layer is light yellowish brown fine sandy loam about 3 inches thick. The subsoil extends to a depth of about 48 inches. It is red clay. It is mottled in the lower part. The substratum to a depth of about 60 inches is mottled red, brown, and gray clay loam and loam.

The Sacul soil is characterized by low fertility and high levels of exchangeable aluminum that are potentially toxic to crops. Water and air move through the soil at a slow rate. Water runs off the surface at a rapid rate. The available water capacity is moderate or high. The seasonal high water table is perched at a depth of about 2 to 3 feet. The shrink-swell potential is high.

Included with these soils in mapping are a few small areas of Darbonne and Mahan soils. Darbonne soils are on narrow ridgetops. They have a loamy subsoil. Mahan soils are on ridgetops and some of the upper side slopes. They do not have ironstone layers in the subsoil. Included soils make up about 15 percent of the map unit.

Most of the acreage is used as woodland. A few areas are used as pasture.

The Darley and Sacul soils are moderately well suited to loblolly pine, shortleaf pine, sweetgum, and southern red oak. White oak and hickory also grow well on the Darley soil. The main concerns in producing and harvesting timber are compaction, a moderate equipment limitation, and a moderate hazard of erosion caused by the slope and the clayey subsoil. Plant competition and the hazard of windthrow are moderate on both soils. Droughtiness in areas of the Darley soil can somewhat limit tree growth. Management that minimizes the risk of erosion should be used in harvesting. Roads and landings can be protected against erosion by constructing diversions and by seeding cuts and fills. In places applying conventional methods of harvesting is difficult because of the slope. Logging during the drier periods helps to prevent compaction. Competing vegetation can be controlled by proper site preparation.

These soils generally are not suited to cultivated crops. The slope and the hazard of erosion are severe limitations.

These soils are poorly suited to pasture. Because of the slope, the hazard of erosion and the equipment limitation are severe. The low fertility and the droughtiness are additional limitations. Common bermudagrass and bahiagrass can be grown. Native grasses grow best in the more steeply sloping areas, where seedbed preparation is difficult. Fertilizer and lime are needed for optimum production of forage.

These soils are poorly suited to urban development. The slope is the main limitation. The high shrink-swell potential, the moderately slow or slow permeability, the wetness, low strength on sites for roads and streets, and the ironstone layers are additional limitations. Seepage is a hazard affecting sewage lagoons in areas of the Darley soil. Digging shallow excavations is difficult in areas of the Darley soil because of the ironstone layers in the subsoil. Because excavation for roads and buildings increases the hazard of erosion, disturbed areas on construction sites should be revegetated as soon as possible. Properly designing buildings and roads helps to offset the effects of shrinking and swelling and the limited ability of the soils to support a load. The slope, the moderately slow or slow permeability, and the high water table are severe limitations affecting septic tank absorption fields. Self-contained disposal units can be used to dispose of sewage, or the bottom of sewage lagoons can be coated with impervious material that helps to prevent seepage.

Because of the severe hazard of erosion and the slope, these soils are poorly suited to most intensive recreational uses. Because of small stones on the surface, the Darley soil is limited as a site for camp areas, picnic areas, and playgrounds. Because of the slope, recreational uses of both soils are limited mainly to a few paths and trails. Establishing the paths and trails across the slope helps to prevent excessive erosion.

The capability subclass is VIe. The woodland ordination symbol is 8R.

DuC—Dubach fine sandy loam, 1 to 5 percent slopes. This gently sloping, well drained and moderately well drained soil is on narrow or broad, convex ridges on stream terraces. Areas range from about 20 to 350 acres in size.

Typically, the surface layer is brown fine sandy loam about 4 inches thick. The subsurface layer is fine sandy loam about 8 inches thick. It is yellowish brown in the upper part and light yellowish brown in the lower part. The upper part of the subsoil is strong brown clay loam and yellowish brown, mottled clay loam about 31 inches thick. The lower part to a depth of about 70 inches is yellowish brown and strong brown, mottled sandy clay loam.

This soil is characterized by low fertility and high levels of exchangeable aluminum that are potentially toxic to most crops. Water and air move through the upper part of the subsoil at a moderate rate and through the lower part at a moderately slow rate. Water runs off the surface at a medium rate. The shrink-swell potential is low. The available water capacity is high. The seasonal high water table is perched at a depth of about 2.5 to 4.0 feet from December through March.

Included with this soil in mapping are a few small areas of Cahaba, Gurdon, and Sacul soils. Cahaba soils are in landscape positions similar to those of the Dubach soil. They have a reddish subsoil. Gurdon soils are lower on the landscape than the Dubach soil. They have gray mottles in the subsoil. Sacul soils have a clayey subsoil. They are at the slightly lower elevations. Included soils make up about 15 percent of the map unit.

Most of the acreage is used as woodland. A small acreage is used as pasture or cropland.

The Dubach soil is well suited to loblolly pine, shortleaf pine, southern red oak, and sweetgum. No significant limitations affect timber production, but plant competition is moderate. If site preparation is not adequate, competition from undesirable understory plants can delay the reestablishment of trees. Prescribed burning and chemical treatment also help to control unwanted vegetation.

This soil is moderately well suited to crops, but it erodes easily in areas not covered by vegetation. The

Figure 2.—A pasture of bahiagrass in an area of Dubach fine sandy loam, 1 to 5 percent slopes.

main crops are corn, grain sorghum, soybeans, and peaches. The low fertility and the potentially toxic levels of exchangeable aluminum in the root zone are additional limitations. This soil is friable and can be easily kept in good tilth. It can be cultivated throughout a wide range in moisture content. Managing crop residue, stripcropping, farming on the contour, and establishing terraces help to control erosion. Most crops respond well to applications of lime and fertilizer, which help to overcome the low fertility and the high levels of exchangeable aluminum.

This soil is well suited to pasture (fig. 2). The low fertility is the only limitation. Erosion is a hazard in tilled areas until pasture grasses are established. Suitable pasture grasses include common bermudagrass, improved bermudagrass, bahiagrass, ryegrass, and crimson clover. Seedbeds should be prepared on the contour or across the slope where practical. Lime and fertilizer are needed for optimum production of forage.

This soil is moderately well suited to urban uses. It has slight limitations affecting sites for buildings and local roads and streets and moderate or severe limitations affecting sites for most sanitary facilities. The wetness and the moderate or moderately slow permeability in the subsoil are limitations affecting sites for septic tank absorption fields. The moderate or moderately slow permeability can be overcome by enlarging the size of the absorption field. The wetness can be reduced by shallow ditches, proper grading, and drainage tile. Seepage is a hazard in areas used for sewage lagoons. The bottom of the lagoon can be coated with impervious material that helps to prevent seepage.

This soil is well suited to intensive recreational areas. The slope is a moderate limitation on playgrounds. Erosion and sedimentation can be controlled by maintaining an adequate vegetative cover.

The capability subclass is IIIe. The woodland ordination symbol is 9A.

GrB—Gurdon silt loam, 1 to 3 percent slopes. This very gently sloping, somewhat poorly drained soil is on stream terraces. Areas range from 20 to 200 acres in size. Slopes are long and smooth and range from 1 to 3 percent.

Typically, the surface layer is brown silt loam about 4 inches thick. The subsurface layer is pale brown silt loam about 5 inches thick. The upper part of the subsoil is yellowish brown, mottled silt loam about 19 inches thick. The lower part to a depth of about 75 inches is yellowish brown, mottled silty clay loam.

This soil is characterized by low fertility and high levels of exchangeable aluminum that are potentially toxic to most crops. Water and air move through the soil at a moderate rate. Water runs off the surface at a slow or medium rate. The surface layer remains wet for relatively long periods in winter and spring. The seasonal high water table is at a depth of about 1 to 2 feet from November through April. The shrink-swell potential is low. The available water capacity is moderate to very high.

Included with this soil in mapping are a few small areas of Dubach and Guyton soils. Dubach soils are higher on the landscape than the Gurdon soil. They have more sand and clay in the subsoil than the Gurdon soil. Guyton soils are gray throughout. They are on narrow flood plains along drainageways. Included soils make up about 15 percent of the map unit.

Most of the acreage is used as woodland. A small acreage is used as pasture or cropland.

The Gurdon soil is moderately well suited to loblolly pine, shortleaf pine, cherrybark oak, shumard oak, willow oak, and sweetgum. The main concerns in producing and harvesting timber are a moderate equipment limitation caused by the wetness and severe plant competition. Using standard wheeled and tracked equipment when the soil is wet causes rutting and compaction. Using low-pressure ground equipment or harvesting during the drier periods helps to prevent damage to the soil and maintain productivity. After harvesting, carefully managed reforestation helps to reduce competition from undesirable understory plants.

This soil is moderately well suited to most cultivated crops. The main hazard is erosion. The main limitations are the wetness, the low fertility, and the potentially toxic levels of exchangeable aluminum in the root zone. The main suitable crops are corn, grain sorghum, and soybeans. This soil is friable and can be easily kept in good tilth. Excessive cultivation can result in the formation of a tillage pan. This pan can be broken by subsoiling when the soil is dry. The wetness can delay planting in some areas. A drainage system is needed in low areas. Crop residue left on or near the surface helps to maintain tilth and control erosion. Tillage on the contour or across the slope helps to control erosion. Most crops respond well to additions of lime and fertilizer, which help to overcome the low fertility and the high levels of exchangeable aluminum in the root zone.

This soil is well suited to pasture. The main limitations are the wetness and the low fertility. Erosion is a hazard in tilled areas until pasture grasses are established. The main suitable pasture plants are common bermudagrass, improved bermudagrass, bahiagrass, white clover, and winterpea. Annual cool-season grasses, such as ryegrass or wheat, are suitable for winter forage. Grazing when the soil is wet results in puddling of the surface layer. A drainage system is needed in low areas. Additions of lime and fertilizer help to overcome the low fertility and improve forage production. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition.

This soil is poorly suited to urban uses. It has severe limitations affecting sites for buildings and most sanitary facilities mainly because of the wetness. Shallow ditches and proper grading help to remove excess water in low areas. Septic tank absorption fields do not function properly during rainy periods because of the wetness and the slow permeability. Lagoons or self-contained disposal units can be used to dispose of sewage.

Mainly because of the wetness, this soil is poorly suited to intensive recreational areas. Excess surface water can be removed by shallow ditches and proper grading.

The capability subclass is IIe. The woodland ordination symbol is 9W.

GyA—Guyton-Ouachita silt loams, frequently flooded. These level and nearly level soils are on flood plains along the major streams. They are frequently flooded, mainly in winter. The two soils occur as areas so intricately intermingled that it is not practical to map them separately at the scale used. Slopes are 0 to 1 percent in areas of the Guyton soil and 0 to 2 percent in areas of the Ouachita soil. Areas range from 40 to 2,000 acres in size. They are about 50 percent Guyton soil and 25 percent Ouachita soil. The poorly drained Guyton soil is in level and depressional areas. The well drained Ouachita soil is on low ridges that are 2 to 6 feet high and 25 to 150 feet wide.

Typically, the Guyton soil has a surface layer of dark grayish brown silt loam about 7 inches thick. The subsurface layer to a depth of about 28 inches is mottled silt loam. It is grayish brown in the upper part and light brownish gray in the lower part. The next 27 inches is grayish brown, mottled silty clay loam and

gray silt loam. The subsoil to a depth of about 85 inches is gray, mottled silty clay loam. In places thin or thick brown loamy overwash is on the surface.

The Guyton soil is characterized by low fertility and high levels of exchangeable aluminum that are potentially toxic to most crops. Water and air move through the soil at a slow rate. Water runs off the surface at a slow rate. The seasonal high water table ranges from near the surface to about 1.5 feet below the surface from December through May. This soil is subject to flooding for very brief to long periods during any time of the year. The flooding occurs at least once every 2 years in winter and spring. It occurs less often during the cropping season. Depth of floodwater ranges from 1 to 8 feet. The available water capacity is high or very high. This soil dries slowly after rains. The shrink-swell potential is low.

Typically, the Ouachita soil has a surface layer of brown silt loam about 4 inches thick. The next 7 inches is dark yellowish brown silt loam. The subsoil extends to a depth of about 62 inches. It is yellowish brown and dark yellowish brown, mottled silty clay loam. The substratum to a depth of about 80 inches is yellowish brown, mottled fine sandy loam.

The Ouachita soil is characterized by low fertility and high levels of exchangeable aluminum that are potentially toxic to most crops. Water and air move through the soil at a moderately slow rate. Water runs off the surface at a slow rate. This soil is subject to flooding for very brief to long periods during any time of the year. The flooding occurs at least once every 2 years in winter and spring. It occurs less often during the cropping season. This soil dries quickly after rains. The available water capacity is high or very high. The seasonal high water table is at a depth of more than 6 feet. The shrink-swell potential is low.

Included with these soils in mapping are a few small areas of Cahaba soils and many small areas of Dela and Iuka soils. Cahaba soils are on stream terraces and on remnants of stream terraces that appear as islands on the flood plains. They have a reddish, distinctly developed subsoil. Dela soils are in landscape positions similar to those of the Ouachita soil. Iuka soils are slightly lower on the landscape than the Ouachita soil and higher on the landscape than the Guyton soil. Dela and Iuka soils have more sand throughout than the Guyton and Ouachita soils. Included soils make up about 25 percent of the map unit.

Most of the acreage is used as woodland. A few areas are used as pasture or cropland.

The Guyton and Ouachita soils are moderately well suited to green ash, sweetgum, Nuttall oak, sugarberry, eastern cottonwood, and American sycamore. Cherrybark oak and shumard oak also grow well on the Ouachita soil. Establishing trees, especially loblolly pine, is difficult because of the wetness and the flooding. Loblolly pine grows well after it is established. The wetness and the flooding limit the use of equipment. Seedling mortality is moderate on the Ouachita soil and high on the Guyton soil. Plant competition is severe on both soils. Conventional methods of harvesting timber generally can be used, but their use may be limited during rainy periods, generally from December through May. Water-tolerant trees should be selected for planting. Planting or harvesting during dry periods helps to prevent excessive rutting and compaction. Undesirable plants can hinder natural or artificial reforestation unless intensive site preparation and maintenance are provided. The wetness and strong winds increase the hazard of windthrow on the Guyton soil.

These soils are poorly suited to cultivated crops. The main limitations are the wetness, the low fertility, and the potentially toxic levels of exchangeable aluminum in the root zone. The flooding is the main hazard. In some years planting is delayed and crops are damaged by floods. Late-planted crops, such as soybeans and grain sorghum, can be grown in most years. Major structures, such as levees, are needed to adequately control flooding.

These soils are poorly suited to pasture. Establishing pasture grasses is difficult because of the flooding, the wetness, and the low fertility. The wetness also limits the choice of plants and the period of grazing. The main suitable pasture plants are common bermudagrass, singletary pea, and vetch. Native grasses can also provide adequate forage for grazing cattle. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition. During periods of flooding, livestock need to be moved to pastures at higher elevations or to pastures that are protected from flooding.

These soils are poorly suited to local roads and streets and most sanitary facilities. They generally are not suited to buildings. The main limitations are the flooding and the wetness. Roads and streets should be constructed above the expected level of flooding. Major flood-control structures and extensive local drainage systems are needed to control flooding and remove excess water.

These soils are poorly suited to recreational development. They are limited by the wetness and the flooding. Protection from flooding is needed for most recreational uses.

The capability subclass is IVw. The woodland ordination symbol assigned to the Guyton soil is 6W, and that assigned to the Ouachita soil is 11W.

IUA—Iuka-Dela association, frequently flooded. These moderately well drained soils are on flood plains along the major streams. They are frequently flooded by stream overflow. The level Iuka soil is on narrow flats and in low areas. The nearly level Dela soil is on low ridges that are 1 to 6 feet high and 50 to 200 feet wide. Slopes are 0 to 1 percent in areas of the Iuka soil and 0 to 2 percent in areas of the Dela soil. Areas range from 20 to 2,000 acres in size. They are about 55 percent Iuka soil and 25 percent Dela soil. Because of the frequent flooding, the number of observations was fewer in areas of this map unit than in other areas of the parish. The detail in mapping, however, is adequate for the expected use of the soils.

Typically, the Iuka soil has a surface layer of dark brown fine sandy loam about 4 inches thick. The next layer is dark yellowish brown, mottled fine sandy loam about 7 inches thick. The underlying material extends to a depth of about 75 inches. It is yellowish brown, mottled fine sandy loam in the upper part; grayish brown, mottled loam in the next part; and gray, mottled loam in the lower part. In places the soil is underlain by buried Guyton soils at a moderate depth.

The Iuka soil is characterized by low fertility and moderately high levels of exchangeable aluminum that are potentially toxic to crops. Water and air move through the soil at a moderate rate. The seasonal high water table is at a depth of 1 to 3 feet from December through April. Water runs off the surface at a slow rate. This soil is flooded for very brief periods, mainly in winter and early spring. The flooding occurs at least once every 2 years. It occurs less often during the cropping season. The available water capacity is moderate or high. The shrink-swell potential is low.

Typically, the Dela soil has a surface layer of brown fine sandy loam about 4 inches thick. The next layer is dark brown fine sandy loam about 7 inches thick. The underlying material to a depth of about 78 inches is mottled fine sandy loam. The upper 12 inches is dark brown, the next part is brown, and the lower part is strong brown.

The Dela soil is characterized by low fertility and moderately high levels of exchangeable aluminum that are potentially toxic to crops. Water and air move through the soil at a moderately rapid rate. Water runs off the surface at a slow rate. The seasonal high water table is at a depth of 3 to 5 feet from December through April. This soil is flooded for very brief periods, mainly in winter and early spring. The flooding occurs at least once every 2 years. It occurs less often during the cropping season. The available water capacity is moderate or high. The shrink-swell potential is low.

Included with these soils in mapping are a few small areas of Cahaba, Guyton, and Ouachita soils. Cahaba soils are on stream terraces and on remnants of stream terraces that appear as islands on the flood plains. They have a distinctly developed, reddish subsoil. Guyton soils are slightly lower on the flood plains than the Iuka soil and are poorly drained. They are grayish throughout. Ouachita soils are in landscape positions similar to those of the Dela soil and are well drained. They have less sand and more clay in the subsoil and underlying material than the Iuka and Dela soils. Included soils make up about 20 percent of the map unit.

The Iuka and Dela soils are used mainly as woodland. They are moderately well suited to loblolly pine, sweetgum, southern red oak, water oak, green ash, eastern cottonwood, and hickory. The main concerns in producing and harvesting timber are a moderate equipment limitation, compaction, and seedling mortality caused by wetness and the flooding. Plant competition also is a concern. Proper site preparation and spraying, cutting, or girdling can eliminate unwanted weeds, brush, or trees. Conventional methods of harvesting timber generally are suitable, but compaction can occur if heavy equipment is used when the soils are wet. The trees that can tolerate seasonal wetness should be selected for planting.

These soils are moderately well suited to cultivated crops. The main limitations are the flooding, the low fertility, and the potentially toxic levels of exchangeable aluminum in the root zone. The wetness is an additional limitation in areas of the Iuka soil. Levees are needed to adequately control flooding. Unless flooding is controlled and a drainage system is installed, late-planted crops, such as grain sorghum and soybeans, are better suited than other crops. Properly arranging the crop rows across the slope and establishing field ditches and vegetated outlets help to remove excess surface water. Returning all crop residue to the soils and including grasses, legumes, or a grass-legume mixture in the cropping system help to maintain fertility and tilth. Crops respond well to applications of lime and fertilizer, which help to overcome the low fertility and the high levels of exchangeable aluminum.

These soils are moderately well suited to pasture. The main limitations are the wetness, the low fertility, and the hazard of overflow. The main suitable pasture plants are bahiagrass, common bermudagrass, improved bermudagrass, tall fescue, singletary pea, and vetch. If the soils are grazed when wet, puddles form and plants are damaged. A properly designed drainage system can remove excess water. Proper grazing practices, weed control, and fertilizer are needed for the maximum quality of forage.

These soils are poorly suited to most urban and

recreational uses. They are generally not suited to dwellings because of the flooding. Roads and streets should be constructed above the expected level of flooding. Major flood-control structures are needed.

The capability subclass is IIw. The woodland ordination symbol assigned to the Iuka soil is 9W, and that assigned to the Dela soil is 4W.

MhC—Mahan fine sandy loam, 1 to 5 percent slopes. This gently sloping, well drained soil is on narrow ridgetops in the uplands. Areas are irregular in shape and range from 20 to 250 acres in size.

Typically, the surface layer is dark brown fine sandy loam about 7 inches thick. The subsurface layer is yellowish red fine sandy loam about 6 inches thick. The subsoil extends to a depth of about 60 inches. The upper part is red sandy clay about 26 inches thick. The lower part is red, mottled sandy clay loam. The substratum to a depth of about 73 inches is red, stratified sandy loam and sandy clay loam.

This soil is characterized by medium fertility and moderately high levels of exchangeable aluminum that are potentially toxic to crops. Water and air move through the upper part of the soil at a moderate rate and through the lower part at a moderately slow rate. The available water capacity is moderate or high. Water runs off the surface at a medium rate. The seasonal high water table is at a depth of more than 6 feet. This soil dries quickly after rains. The shrink-swell potential is low.

Included with this soil in mapping are a few small areas of Bowie, Darbonne, Darley, and Sacul soils. Bowie soils are at the slightly lower elevations and on the broader ridgetops. Bowie soils are loamy throughout. Darbonne and Darley soils are in landscape positions similar to those of the Mahan soil. Darbonne soils have a sandy surface layer and a loamy subsoil. Darley soils have ironstone layers in the subsoil. Sacul soils have gray mottles in the upper part of the subsoil. They are at the lower elevations. Included soils make up about 15 percent of the map unit.

Most of the acreage is used as woodland. A few areas are used as pasture or cropland.

The Mahan soil is well suited to loblolly pine, shortleaf pine, hickory, southern red oak, sweetgum, and white oak. Few limitations affect woodland management.

This soil is moderately well suited to cultivated crops. The main limitations are the medium fertility and the potentially toxic levels of exchangeable aluminum in the root zone. Erosion is a hazard. This soil is friable and can be easily kept in good tilth. It can be worked throughout a wide range in moisture content. Crop residue left on or near the surface helps to control runoff and maintain tilth and the content of organic matter. Crops respond well to additions of lime and fertilizer, which help to overcome the medium fertility and the moderately high levels of exchangeable aluminum. Conservation tillage, terraces, diversions, and grassed waterways help to control erosion.

This soil is well suited to pasture. Few limitations affect this use. Erosion is a hazard, however, in tilled areas until pasture grasses are established. The medium fertility is a minor limitation. The main suitable pasture plants are common bermudagrass, bahiagrass, crimson clover, and ryegrass. Grasses and legumes grow well if adequate fertilizer is provided. Rotation grazing helps to maintain the quality of forage.

This soil is well suited to urban development. It has slight or moderate limitations affecting sites for dwellings and sanitary facilities. The slope, the moderate permeability, the clayey subsoil, and low strength on sites for roads are the main limitations. Seepage is a hazard in areas used for sewage lagoons. The hazard of erosion is increased if the soil is left exposed during site development. Properly designing roads helps to offset the limited ability of the soil to support a load.

This soil is well suited to recreational development. The slope and small stones on the surface are limitations on playgrounds. Erosion can be controlled in intensively used areas by maintaining a good plant cover. The plant cover can be maintained by adding fertilizer and controlling traffic.

The capability subclass is IIIe. The woodland ordination symbol is 9A.

MHE—Mahan fine sandy loam, 5 to 12 percent slopes. This strongly sloping, well drained soil is on side slopes in the uplands. Areas are irregular in shape and range from 40 to 300 acres in size. Because of the slope, the number of observations was fewer in areas of this soil than in other areas of the parish. The detail in mapping, however, is adequate for the expected use of this soil.

Typically, the surface layer is yellowish brown fine sandy loam about 8 inches thick. The subsurface layer is yellowish red fine sandy loam about 6 inches thick. The subsoil extends to a depth of about 45 inches. It is yellowish red sandy clay loam in the upper part, red sandy clay in the next part, and red sandy clay loam in the lower part. The substratum to a depth of about 75 inches is red, stratified sandy clay loam and sandy loam.

This soil is characterized by medium fertility and moderately high levels of exchangeable aluminum that are potentially toxic to crops. Water and air move through the upper part of the soil at a moderate rate

and through the lower part at a moderately slow rate. The available water capacity is moderate or high. The seasonal high water table is below a depth of 6 feet. Water runs off the surface at a rapid rate. The shrink-swell potential is low.

Included with this soil in mapping are a few small areas of Darley and Sacul soils. Darley soils are on the upper side slopes. They have ironstone layers in the subsoil. Sacul soils are on the lower side slopes. They have gray mottles in the upper part of the subsoil. Included soils make up about 15 percent of the map unit.

Most of the acreage is used as woodland. A few areas are used as pasture or cropland.

The Mahan soil is well suited to loblolly pine, shortleaf pine, hickory, southern red oak, sweetgum, and white oak. Few limitations affect woodland management. Because of the slope and the rapid rate of runoff, erosion is a hazard in disturbed areas, such as roads and landings. Roads and landings can be protected against erosion by constructing diversions and by seeding cuts and fills.

Because of the severe hazard of erosion, this soil is generally not suited to cultivated crops. Other limitations are the medium fertility and the potentially toxic levels of exchangeable aluminum in the root zone. If the soil is adequately protected against erosion, close-sown crops, such as small grains, can be grown in the less sloping areas. The hazard of erosion can be reduced by seeding fall grain or winter pasture grasses early, using conservation tillage, and farming and seeding on the contour or across the slope. Waterways should be shaped and seeded to perennial grasses.

This soil is moderately well suited to pasture. The main limitations are the slope and the medium fertility. The main suitable pasture plants are common bermudagrass, bahiagrass, crimson clover, and ryegrass. Seedbeds should be prepared on the contour or across the slope where practical. In places the use of equipment is limited by short and irregular slopes. Proper grazing practices, weed control, and fertilizer are needed for the maximum quality of forage.

This soil is moderately well suited to urban development. The main limitations are the clayey subsoil, the slope, the moderate permeability, and low strength on sites for roads. Excavation for roads and buildings increases the hazard of erosion. Preserving the existing plant cover during construction and revegetating disturbed areas on construction sites as soon as possible help to control erosion. Properly designing roads helps to overcome the limited ability of the soil to support a load. Septic tank absorption fields may not function properly during rainy periods because of the moderate permeability. Increasing the size of the absorption field helps to overcome this limitation. Installing septic tank absorption lines on the contour helps to prevent the effluent from absorption fields from surfacing in downslope areas.

This soil is moderately well suited to recreational uses. It is limited mainly by the slope. Cuts and fills should be seeded or mulched. A plant cover can be maintained by adding fertilizer and controlling traffic.

The capability subclass is VIe. The woodland ordination symbol is 9A.

MmB—McLaurin loamy fine sand, 1 to 3 percent slopes. This very gently sloping, well drained soil is on convex ridgetops in the uplands. Areas are irregular in shape and range from 20 to 350 acres in size.

Typically, the surface layer is dark brown loamy fine sand about 5 inches thick. The next 9 inches is yellowish brown loamy fine sand. The subsoil extends to a depth of about 85 inches. The upper part is red loam about 7 inches thick. The next 22 inches is red sandy loam. The next 12 inches is yellowish red and light yellowish brown sandy loam. The lower part is yellowish red sandy clay loam about 30 inches thick.

This soil is characterized by low fertility. Water and air move through the subsoil at a moderate rate. The available water capacity is low or moderate. The seasonal high water is below a depth of 6 feet. Water runs off the surface at a slow rate. This soil dries quickly after rains. The shrink-swell potential is low.

Included with this soil in mapping are a few small areas of Betis, Briley, and Trep soils. Betis and Briley soils are at the slightly higher elevations. Betis soils are sandy throughout. Briley and Trep soils have a surface layer and subsurface layer that have a combined thickness of more than 20 inches. Trep soils are at the slightly lower elevations. Included soils make up about 15 percent of the map unit.

Most of the acreage is used as woodland. A small acreage is used as cropland or pasture.

The McLaurin soil is well suited to loblolly pine, shortleaf pine, post oak, and hickories. Few limitations affect woodland management, but the low fertility and droughtiness can limit tree growth.

This soil is moderately well suited to cultivated crops. The main limitations are the low fertility, the low or moderate available water capacity, and the hazard of erosion. Suitable crops are corn, soybeans, grain sorghum, and watermelons. This soil is very friable and can be easily kept in good tilth. It can be worked throughout a wide range in moisture content. In areas where water of suitable quality is available, supplemental irrigation can prevent crop damage during dry periods of most years. Excessive cultivation can result in the formation of a tillage pan. This pan can be

broken by subsoiling when the soil is dry. The content of organic matter can be maintained by using all crop residue, plowing under cover crops, and selecting a suitable cropping system. Establishing terraces and farming on the contour help to control sheet and rill erosion. Crops respond well to additions of lime and fertilizer, which help to overcome the low fertility.

This soil is well suited to pasture. Few limitations affect this use. The low fertility and the droughtiness can limit the production of forage. The main suitable pasture plants are common bermudagrass, improved bermudagrass, bahiagrass, crimson clover, and wheat. Proper grazing practices, weed control, and fertilizer are needed for the maximum quality of forage.

This soil is moderately well suited to urban development. Revegetating disturbed areas on construction sites as soon as possible helps to control erosion. Irrigation is needed to establish lawn grasses and ornamental trees and shrubs. Cutbanks are not stable and are subject to slumping. The floor of sewage lagoons should be sealed with impervious material that helps to prevent the seepage of effluent and the contamination of ground water.

This soil is well suited to recreational uses. A good plant cover helps to control erosion in intensively used areas, such as playgrounds. The plant cover can be maintained by adding fertilizer and controlling traffic. Irrigation is needed to maintain an adequate grass cover on golf fairways.

The capability subclass is IIe. The woodland ordination symbol is 8A.

ScC—Sacul very fine sandy loam, 1 to 5 percent slopes. This gently sloping, moderately well drained soil is on ridgetops in the uplands. Areas range from 20 to 500 acres in size.

Typically, the surface layer is dark brown very fine sandy loam about 4 inches thick. The subsurface layer is yellowish brown very fine sandy loam about 6 inches thick. The subsoil extends to a depth of about 78 inches. The upper part is yellowish red silty clay about 12 inches thick. The next part is red, mottled clay about 20 inches thick. The lower part is gray, mottled silty clay loam. The substratum to a depth of about 84 inches is mottled yellowish red, gray, and strong brown sandy clay loam.

This soil is characterized by low fertility and high levels of exchangeable aluminum that are potentially toxic to crops. Water and air move through the soil at a slow rate. Water runs off the surface at a medium rate. The seasonal high water table is perched at a depth of about 2 to 4 feet from December through April. The available water capacity is moderate or high. The shrink-swell potential is high in the subsoil.

Included with this soil in mapping are a few small areas of Angie, Bowie, Darley, Dubach, and Mahan soils. Angie soils are at the slightly lower elevations. They have a subsoil that is yellowish brown in the upper part. Bowie soils are at the higher elevations. Bowie and Dubach soils have a brownish subsoil. Dubach soils are on terraces. Darley and Mahan soils are on ridgetops and at the higher elevations. Darley soils have ironstone layers in the subsoil. Mahan soils do not have gray mottles in the upper part of the subsoil. Included soils make up about 15 percent of the map unit.

Most of the acreage is used as woodland or pasture. A small acreage is used as cropland.

The Sacul soil is moderately well suited to loblolly pine, shortleaf pine, sweetgum, and southern red oak. The main management concerns are compaction, an equipment limitation, and plant competition caused by the wetness and the clayey subsoil. The high water table and strong winds increase the hazard of windthrow. Rutting and compaction can be minimized by logging during the drier seasons. Proper site preparation and spraying, cutting, or girdling can eliminate unwanted weeds, brush, or trees.

Mainly because of a severe hazard of erosion, this soil is poorly suited to cultivated crops. The main limitations are the low fertility and the potentially toxic levels of exchangeable aluminum in the root zone. Suitable crops are soybeans, grain sorghum, and corn. This soil is friable and can be easily kept in good tilth. Stripcropping, farming on the contour, establishing terraces, and managing crop residue help to control erosion. Most crops respond well to additions of lime and fertilizer, which help to overcome the low fertility and the high levels of exchangeable aluminum.

This soil is moderately well suited to pasture. Erosion is the main hazard. The low fertility is the main limitation. Suitable pasture plants are common bermudagrass, improved bermudagrass, bahiagrass, crimson clover, and ryegrass. Preparing seedbeds on the contour or across the slope helps to control erosion. Fertilizer and lime are needed for optimum production of forage.

This soil is poorly suited to urban uses. The main limitations are the clayey subsoil, the slow permeability, the high shrink-swell potential, low strength on sites for roads, and the wetness. The slow permeability and the wetness are severe limitations if this soil is used for septic tank absorption fields. Sewage lagoons or self-contained disposal units can be used to dispose of sewage. Buildings and roads should be designed to withstand the effects of shrinking and swelling. The wetness can be reduced by installing drainage tile around the footings of buildings. Properly designing

roads helps to overcome the limited ability of the soil to support a load.

This soil is moderately well suited to intensive recreational uses. The slope and small stones on the surface are limitations on playgrounds. The slow permeability is a limitation for most recreational uses. Maintaining a plant cover helps to control runoff and erosion.

The capability subclass is IVe. The woodland ordination symbol is 8C.

SCE—Sacul very fine sandy loam, 5 to 12 percent slopes. This strongly sloping, moderately well drained soil is on side slopes in the uplands. Areas are irregular in shape and range from 40 to 350 acres in size. Because of the slope, the number of observations was fewer in areas of this soil than in other areas of the parish. The detail in mapping, however, is adequate for the expected use of the soil.

Typically, the surface layer is dark grayish brown very fine sandy loam about 2 inches thick. The subsurface layer is yellowish brown very fine sandy loam about 10 inches thick. The subsoil extends to a depth of about 60 inches. In sequence downward, it is red clay; red, mottled clay; and silty clay and clay loam mottled in shades of red and gray. The substratum to a depth of about 75 inches is mottled red and gray clay loam.

This soil is characterized by low fertility and high levels of exchangeable aluminum that are potentially toxic to crops. Water and air move through the soil at a slow rate. The available water capacity is moderate or high. Water runs off the surface at a rapid rate. The seasonal high water table is perched at a depth of about 2 to 4 feet from December through April. This soil dries quickly after rains. The shrink-swell potential is high.

Included with this soil in mapping are a few small areas of Darley and Mahan soils. These soils are on ridgetops and the upper part of side slopes at elevations higher than those of the Sacul soil. Darley soils have ironstone layers in the subsoil. Mahan soils do not have gray mottles in the upper part of the subsoil. Included soils make up about 15 percent of the map unit.

Most of the acreage is used as woodland. A few areas are used as pasture.

The Sacul soil is moderately well suited to loblolly pine, shortleaf pine, sweetgum, and southern red oak. The main concerns in producing and harvesting timber are compaction, an equipment limitation, plant competition, and windthrow. Conventional methods of harvesting trees generally can be used. Logging during the drier seasons helps to prevent rutting and compaction. Proper site preparation and spraying, cutting, or girdling can eliminate unwanted weeds, brush, or trees.

This soil is generally not suited to cultivated crops because the hazard of erosion is too severe.

This soil is moderately well suited to pasture. The low fertility is the main limitation, and erosion is the main hazard. Suitable pasture plants are common bermudagrass, improved bermudagrass, bahiagrass, crimson clover, and ryegrass. Native grasses grow best in the more sloping areas, where seedbed preparation is difficult. Proper grazing practices, weed control, and fertilizer are needed for the maximum quality of forage.

This soil is poorly suited to urban development. The main limitations are the slow permeability, the slope, the clayey subsoil, wetness, a high shrink-swell potential, and low strength on sites for roads. Revegetating disturbed areas on construction sites as soon as possible helps to control erosion. A plant cover can be established and maintained by properly applying fertilizer, seeding, mulching, and land shaping. Increasing the size of the septic tank absorption field helps to overcome the slow permeability in the subsoil. Lagoons or self-contained disposal units can be used to dispose of sewage. Properly designing buildings and roads helps to offset the effects of shrinking and swelling and the limited ability of the soil to support a load. The wetness can be reduced by installing drainage tile around the footings of buildings.

This soil is moderately well suited to recreational uses. It is limited mainly by the slow permeability and the slope. Seeding or mulching cuts and fills helps to prevent erosion. A plant cover should be maintained by adding fertilizer and controlling traffic.

The capability subclass is VIe. The woodland ordination symbol is 8C.

TpC—Trep loamy fine sand, 1 to 5 percent slopes. This gently sloping, moderately well drained soil is on ridgetops in the uplands. Areas are irregular in shape and range from 30 to 350 acres in size.

Typically, the surface layer is yellowish brown loamy fine sand about 7 inches thick. The subsurface layer is light yellowish brown loamy fine sand about 20 inches thick. The upper part of the subsoil is yellowish brown, mottled sandy clay loam about 25 inches thick. The lower part to a depth of about 72 inches is mottled yellowish brown, gray, and red sandy clay.

This soil is characterized by low fertility and moderately high levels of exchangeable aluminum that are potentially toxic to crops. Permeability is rapid in the surface layer and subsurface layer, moderate in the upper part of the subsoil, and moderately slow in the lower part. The available water capacity is low or

moderate. Water runs off the surface at a slow rate. The seasonal high water table is perched at a depth of about 3.5 to 5.0 feet from November through May. The shrink-swell potential is low in the upper part of the soil and moderate in the lower part.

Included with this soil in mapping are a few small areas of Betis, Bowie, Briley, and McLaurin soils. Betis, Briley, and McLaurin soils are at the slightly higher elevations. Bowie soils are at the lower elevations. Included soils do not have a clayey layer in the subsoil. They make up about 15 percent of the map unit.

Most of the acreage is used as woodland. A small acreage is used as cropland or pasture.

The Trep soil is moderately well suited to loblolly pine, shortleaf pine, post oak, sweetgum, and southern red oak. The main concerns in managing timber are plant competition and seedling mortality. Droughtiness increases seedling mortality. Seedlings should be planted in early spring so that they can obtain sufficient moisture from spring rains. Site preparation helps to control initial plant competition, and spraying helps to control subsequent growth. Restricting burning and leaving slash well distributed help to maintain the content of organic matter.

This soil is moderately well suited to cultivated crops. The main limitations are the droughtiness, the low fertility, and the potentially toxic levels of exchangeable aluminum in the root zone. Erosion is the main hazard. Suitable crops are corn, grain sorghum, and watermelons. This soil is friable and can be easily kept in good tilth. It can be worked throughout a wide range in moisture content. Sprinkler systems are suitable irrigation methods on this soil. Tilth and fertility can be improved by returning crop residue to the soil. Crops respond well to applications of lime and a complete fertilizer, which help to overcome the low fertility and the high levels of exchangeable aluminum. Terraces help to control runoff and erosion and help to conserve moisture.

This soil is moderately well suited to pasture. The main limitations are the droughtiness and the low fertility. Erosion is a hazard in tilled areas until pasture grasses are established. The main suitable pasture plants are common bermudagrass, improved bermudagrass, bahiagrass, and ryegrass. Fertilizer and lime are needed for optimum production of forage. Periodic mowing and clipping help to maintain uniform plant growth and help to prevent selective grazing.

This soil is moderately well suited to urban development. The wetness, the moderate or moderately slow permeability, and low strength on sites for roads are the main limitations. The wetness and the moderate or moderately slow permeability increase the possibility that septic tank absorption fields will fail. Sewage lagoons or self-contained disposal units can be used to dispose of sewage. Revegetating disturbed areas on construction sites as soon as possible helps to control erosion. Cutbanks are not stable and are subject to slumping. Seepage is a hazard in areas used for sewage lagoons. This hazard can be overcome by coating the bottom of the lagoon with impervious material. Properly designing roads helps to overcome the limited ability of the soil to support a load. Irrigation is needed to establish and maintain grasses on golf fairways.

This soil is moderately well suited to recreational uses. The main limitation is the sandy surface layer. The slope is a limitation on playgrounds. Erosion on playgrounds can be controlled by maintaining a plant cover. The plant cover can be maintained by adding fertilizer and controlling traffic.

The capability subclass is IIIe. The woodland ordination symbol is 9S.

Prime Farmland

In this section, prime farmland is defined and the soils in Lincoln Parish that are considered prime farmland are listed.

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the Nation's short- and long-range needs for food and fiber. The acreage of high-quality farmland is limited, and the U.S. Department of Agriculture recognizes that government at local, State, and Federal levels, as well as individuals, must encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland soils, as defined by the U.S. Department of Agriculture, are soils that are best suited to food, feed, forage, fiber, and oilseed crops. Such soils have properties that favor the economic production of sustained high yields of crops. The soils need only to be treated and managed by acceptable farming methods. The moisture supply must be adequate, and the growing season must be sufficiently long. Prime farmland soils produce the highest yields with minimal expenditure of energy and economic resources. Farming these soils results in the least damage to the environment.

Prime farmland soils may presently be used as cropland, pasture, or woodland or for other purposes. They either are used for food or fiber or are available for these uses. Urban or built-up land, public land, and water areas cannot be considered prime farmland. Urban or built-up land is any contiguous unit of land 10 acres or more in size that is used for such purposes as housing, industrial, and commercial sites, sites for institutions or public buildings, small parks, golf courses, cemeteries, railroad yards, airports, sanitary landfills, sewage treatment plants, and water-control structures. Public land is land not available for farming in National forests, National parks, military reservations, and State parks.

Prime farmland soils usually receive an adequate and dependable supply of moisture from precipitation or irrigation. The temperature and growing season are favorable. The acidity or alkalinity level of the soils is acceptable. The soils have few or no rocks and are permeable to water and air. They are not excessively erodible or saturated with water for long periods and are not frequently flooded during the growing season. The slope ranges mainly from 0 to 5 percent.

The following map units are considered prime farmland in Lincoln Parish. The location of each map unit is shown on the detailed soil maps at the back of this publication. The extent of each unit is given in table 5. The soil qualities that affect use and management are described in the section "Detailed Soil Map Units." This list does not constitute a recommendation for a particular land use. Soils that have limitations, such as a high water table or flooding, may qualify as prime farmland if these limitations are overcome by such measures as drainage or flood control. Only the soils that have few limitations and do not need any additional improvements to qualify as prime farmland are included in the list.

AnB	Angie very fine sandy loam, 1 to 3 percent slopes
BoC	Bowie fine sandy loam, 1 to 5 percent slopes
ChB	Cahaba fine sandy loam, 1 to 3 percent slopes
DbC	Darbonne loamy fine sand, 1 to 5 percent slopes
DrC	Darley gravelly fine sandy loam, 1 to 5 percent slopes
DuC	Dubach fine sandy loam, 1 to 5 percent slopes
GrB	Gurdon silt loam, 1 to 3 percent slopes
MhC	Mahan fine sandy loam, 1 to 5 percent slopes
MmB	McLaurin loamy fine sand, 1 to 3 percent slopes
ScC	Sacul very fine sandy loam, 1 to 5 percent slopes

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help to prevent soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis for predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern that is in harmony with nature.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Crops and Pasture

Richard C. Aycock, conservationist, Natural Resources Conservation Service, helped prepare this section.

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils, including some not commonly grown in the survey area, are identified; the system of land capability classification used by the Natural Resources Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under the heading "Detailed Soil Map Units." Specific recommendations for fertilizers, crop varieties, and seeding mixtures are not given. They can change as more information is obtained. Specific information is available at the local office of the Natural Resources Conservation Service, the Cooperative Extension Service, or the Louisiana Agricultural Experiment Station.

In 1987, about 57,788 acres in Lincoln Parish was farm land. About 24,698 acres was used for crops, and about 7,609 acres was harvested. The main crops include forage crops, hay, peaches, watermelons, and other vegetables. More than 28,474 acres was used as pasture. The average size of a farm is 168 acres.

Differences in crop suitability and management needs result from differences in soil characteristics, such as fertility levels, erodibility, organic matter content, availability of water for plants, drainage, and the hazard of flooding. Cropping systems and soil tillage also are an important part of management. Each farm has a unique soil pattern and, therefore, unique management problems. Some principles of farm management apply to specific soils and certain crops. This section, however, presents the general principles of management that can be applied widely to the soils in the parish.

Perennial grasses or legumes or mixtures of these are grown for pasture and hay. The mixtures generally consist of either a summer or a winter perennial grass and a suitable legume. Also, many farmers seed small grain or ryegrass in the fall for winter and spring forage. Excess grass in summer is harvested as hay for use in winter (fig. 3).

Common bermudagrass, improved bermudagrass, and Pensacola bahiagrass are the most commonly

Figure 3.—Bahiagrass harvested for hay in an area of Trep loamy fine sand, 1 to 5 percent slopes.

grown summer perennials. Most of the grasses produce good quality forage. Tall fescue, the main winter perennial grass, grows well only on soils that have a favorable moisture content. All of these grasses respond well to fertilizers, particularly nitrogen.

White clover, crimson clover, arrowleaf clover, vetch, and winterpea are the most commonly grown legumes. All of these legumes respond well to lime, particularly on acid soils.

Proper grazing is essential for high-quality forage, stand survival, and erosion control. Weed and brush control, proper applications of fertilizer and lime, and renovation of the pasture also are important.

Grazing the understory native plants in woodland provides additional forage. About 8,343 acres of woodland are used for grazing in Lincoln Parish. Forage volume varies with the woodland site, the condition of the native forage, and the density of the timber stand. Most woodland areas are managed mainly for timber. These areas, however, can provide substantial volumes of forage under proper management. Careful management of stocking rates and grazing periods ensures optimum forage production and maintains an adequate cover of understory plants, which helps to control erosion.

Fertilizer and lime. The soils in Lincoln Parish range from extremely acid to slightly acid to a depth of 20 inches. In most of the soils, the content of calcium is low or very low. Many soils contain large amounts of exchangeable aluminum, which can be toxic to some plants. Additions of lime can help to overcome the excessive levels of aluminum in these soils. The

amount of fertilizer and lime needed depends upon the kind of crop to be grown, past cropping history, the level of yield desired, and the kind of soil. The amount should be based on the laboratory analysis of soil samples from each field. Agricultural agencies in the parish can supply detailed information and instructions on collecting and testing soil samples.

Organic matter content. Organic matter is an important source of nitrogen for crops. It also increases the rate of water intake, reduces surface crusting, reduces the erodibility of soils, and improves tilth. In most of the cultivated soils in the parish, organic matter content is low or moderate. To a limited extent, the level of organic matter can be maintained or improved by leaving plant residue on the surface, growing crops that produce an abundance of foliage and an extensive root system, adding barnyard manure and poultry litter, and growing perennial grasses and legumes in rotation with other crops.

Soil tillage. The main purposes of tillage are seedbed preparation and weed control. Preparing seedbeds, cultivating, and harvesting damage soil structure, and excessive tillage should be avoided. A compacted layer can develop in the loamy soils in the parish if the soils are plowed at the same depth for long periods or if they are plowed when wet. The compacted layer, generally known as a traffic pan or plowpan, develops just below the plow layer. This condition can be avoided if the soil is not plowed when wet or if the depth of plowing is varied. Also, this layer can be broken up by chiseling or subsoiling. The use of tillage implements that stir the surface but leave crop residue in place protects the soil from beating rains. This protection of the soil surface helps to control erosion, reduces runoff, and increases infiltration.

Water for plant growth. The available water capacity of the soils in the parish ranges from low to very high. In many years, however, sufficient amounts of water are not available at the critical time for optimum plant growth unless irrigation is used. Rainfall is heavy in winter and spring, and sufficient amounts of rain generally fall in the summer and autumn of most years. During dry periods in summer and autumn, however, most of the soils do not have sufficient water supplies for plants. This rainfall pattern favors the growth of early maturing crops.

Cropping systems. A good cropping system includes a legume for nitrogen, a cultivated crop to help control weeds, a deep-rooted crop to utilize subsoil fertility and maintain subsoil permeability, and a close-growing crop to help maintain the content of organic matter. A crop sequence that keeps the soil covered most of the year also helps to control erosion.

A suitable cropping system varies according to the needs of the farmer and the characteristics of the soil. On livestock farms, for example, cropping systems that have higher percentages of pasture than those on cash-crop farms are generally used.

Additional information on cropping systems can be obtained from the local office of the Natural Resources Conservation Service, the Cooperative Extension Service, or the Louisiana Agricultural Experiment Station.

Control of erosion. Erosion is a hazard on soils on terraces and uplands in the parish. It generally is not a serious hazard on soils on flood plains, mainly because these soils are level or nearly level. Sheet and rill erosion is moderately severe on all fall-plowed fields. Some gully erosion occurs mainly in areas of the more sloping soils. Sheet, rill, and gully erosion can be minimized by maintaining a cover of vegetation or plant residue, farming on the contour, stripcropping, using a system of conservation tillage, and controlling weeds by methods other than fallow plowing. Disturbed areas around construction sites should be seeded and mulched immediately after construction. Water-control structures in drainageways and ditches help to control gully erosion.

Drainage. On a few of the soils in the parish, a surface drainage system is needed to make them more suitable for crops and pasture. A properly designed system of field ditches can remove excess water from seasonally wet soils, such as Guyton soils, but major flood-control structures are needed to protect such soils as Dela, luka, and Ouachita soils from stream overflow.

Yields per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 6. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. The land capability classification also is shown in the table.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each

crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 6 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Natural Resources Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for use as cropland. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for pasture, for woodland, and for engineering purposes.

In the capability system, soils are generally grouped at three levels—capability class, subclass, and unit. Only class and subclass are used in this survey.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode, but they have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, IIe. The letter *e* shows that the main hazard is the risk of erosion unless a close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c,* used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

There are no subclasses in class I because the soils of this class have few limitations. The soils in class V are subject to little or no erosion, but they have other limitations that restrict their use to pasture, woodland, wildlife habitat, or recreation. Class V contains only the subclasses indicated by *w, s,* or *c.*

The capability classification of each map unit is given in the section "Detailed Soil Map Units" and in the yields table.

Woodland Management and Productivity

Donald Lawrence, forester, Natural Reosurces Conservation Service, helped prepare this section.

This section contains information on the relationship between trees and their environment, particularly trees and the soils in which they grow. It provides information on the kind, amount, and condition of woodland resources in Lincoln Parish as well as soil interpretations that can be used in planning. Depth, fertility, texture, and the available water capacity influence tree growth.

Soil directly influences the growth, management, harvesting, and multiple uses of forests. It is the medium in which a tree is anchored and from which it draws its nutrients and moisture. Soil characteristics, such as chemical composition, texture, structure, depth, and slope position, affect tree growth, seedling survival, species adaptability, and equipment limitations.

The ability of a soil to supply nutrients and moisture to trees is strongly related to its texture, structure, and depth. Generally, sandy soils, such as Betis soils, are less fertile and have a lower available water capacity than loamy soils, such as Gurdon soils.

The soil characteristics, in combination, largely determine the forest stand species composition and

influence decisions of management and use. Sweetgum, for example, is tolerant of many soils and sites but grows best on the rich, moist, alluvial loamy soils on bottom land. The use of heavy logging and site-preparation equipment is more restricted on loamy soils that have a clayey subsoil than on the better drained soils that are loamy throughout.

Woodland Resources

Lincoln Parish has about 223,900 acres of woodland. About 2.5 percent of the woodland is owned by farmers, 5.2 percent is owned by the forest industry, and 92.3 percent is private land *(18, 19)*.

Oak trees grow on a variety of soils. White oak grows on flood plains, terraces, uplands, and well drained second bottoms. It grows best on deep, well drained loamy soils. Water oak and willow oak grow on many alluvial soils, on well drained loamy soils on terraces, and on colluvial soils on the bottom land of large and small streams. Southern red oak grows mainly on dry, sandy or loamy soils on uplands. It also grows on well drained soils on terraces and bottom land. Post oak is well adapted to the uplands and grows on sandy ridges and southern exposures.

Loblolly pine and shortleaf pine are the dominant and most widely grown trees in Lincoln Parish. They are widely distributed because they can grow on a variety of soils. They generally are closely intermingled. Loblolly pine grows best on soils that have poor surface drainage, a thick, medium-textured surface layer, and a fine-textured subsoil. The production of loblolly pine is highest on soils on stream bottoms and terraces and lowest on shallow, wet, or eroded soils. Shortleaf pine grows well on deep, well drained, sandy and loamy soils. In good areas, site indices at age 50 can exceed 100 feet. Lincoln Parish has no natural stands of longleaf pine or slash pine.

Commercial forests can be divided into forest types based on tree species, site quality, or age. In this survey, forest types are named for the dominant trees growing in the tree stand. The stands are similar in character, composed of the same species, and growing under the same ecological and biological conditions.

The loblolly-shortleaf pine forest type comprises about 56.4 percent of the forest land in the parish. Loblolly pine is generally dominant except on the drier sites. On well drained soils, scattered hardwoods, such as sweetgum, blackgum, southern red oak, post oak, white oak, mockernut hickory, and pignut hickory, are mixed with the pines. On some of the more moist sites, sweetgum, red maple, water oak, and willow oak are mixed with the pines. American beech and ash are associated with this forest type along stream bottoms.

The oak-pine forest type comprises about 12.8 percent of the forest land in the parish. About 50 to 75 percent of the stand is hardwoods, generally upland oaks, and 25 to 50 percent is softwoods (not including cypress). The species that make up a site of the oak-pine forest type are primarily determined by the soil, slope, and aspect. On the higher, drier sites, the hardwood components tend to be upland oaks, such as post oak, southern red oak, and blackjack oak. On the more moist and fertile sites, white oak, southern red oak, and black oak are dominant. Blackgum, winged elm, red maple, and various hickories are associated with the oak-pine type on both of these broad sites.

The oak-hickory forest type comprises about 23.1 percent of the forest land in the parish. Upland oaks or hickories, singly or in combination, dominate the stand. Elm and maple are commonly associated with this forest type.

The oak-gum-cypress forest type comprises about 7.7 percent of the forest land in the parish. Most sites consist of bottom-land forests of blackgum, sweetgum, oak, and baldcypress, singly or in combination. Black willow, ash, hackberry, maple, and elm are associated with this forest type.

By physiographic site, the forest land in Lincoln Parish is about 64.5 percent pine and 35.5 percent hardwood. About 73.4 percent of the volume of sawtimber is pine and 26.6 percent is hardwood. About 59 percent of the forest land is used for sawtimber, 20 percent is used for poletimber, 18 percent supports saplings and seedlings, and 3 percent is classified as nonstocked. About 18 percent of the forest land produces 165 cubic feet or more of wood per acre. About 33.3 percent produces 120 to 165 cubic feet per acre, 28.2 percent produces 85 to 120 cubic feet per acre, and 20.5 percent produces 50 to 85 cubic feet per acre *(10, 19)*.

Timber production is an important part of the economy in the parish (fig. 4). About 5 percent of the upland pine sites is owned by the forest industry and is generally well managed. The rest is privately owned. Many privately owned tracts are producing below their potential. Most of these tracts can be improved by thinning out mature trees and undesirable species. Improved methods of tree planting and protection from grazing, fire, insects, and diseases are also needed.

The Natural Resources Conservation Service, the Louisiana Office of Forestry, and the Louisiana Cooperative Extension Service can help to determine woodland management needs in specific areas.

Forestry practices that help to maintain the content of organic matter, prevent compaction, and maintain soil moisture, fertility, and aeration include using technical methods for site preparation rather than mechanical methods. If mechanical methods are needed, the

Figure 4.—Sawlogs of loblolly pine in an area of Dubach loamy fine sand, 1 to 5 percent slopes. The logs in this loading area will be hauled to nearby sawmills.

method using a roller drum chopper should be selected rather than the shear and windrow method. Other important forestry practices are delaying site preparation and harvesting until the soil is dry, using logging slash to protect the soil, applying special treatments to critically eroding areas, leaving filter strips along streams, properly installing logging and access roads, installing water-control and drainage systems, and constructing stream crossings.

The quality and production of tree stands can be improved by silvicultural practices. These practices include sanitation cutting, which removes trees killed or injured by fire, insects, and fungi; improvement cutting, which improves the composition and condition of stands; and thinning, which increases the growth rate of trees by reducing plant competition.

Multiple Uses of Forests

Woodland is valuable in providing wildlife habitat, recreational areas, natural beauty, and forage and in helping to conserve soil and water. The commercial forest land of Lincoln Parish provides food and shelter for wildlife and offers opportunities for sport and recreational activities annually to many users. Forest land provides watershed protection, helps to control erosion and minimize sedimentation, and enhances the quality and value of water resources.

Trees can be planted to screen distracting views of

dumps and other unsightly areas, reduce the velocity of winds, muffle the sound of traffic, and lend beauty to the landscape. They produce fruits and nuts for use by people as well as wildlife. Trees help to filter out airborne dust and other impurities, convert carbon dioxide into oxygen, and provide shade from the sun's hot rays.

Table 7 can be used by woodland managers planning ways to increase the productivity of forest land. Some soils respond better to applications of fertilizer than others, and some are more susceptible to landslides and erosion after roads are built and timber is harvested. Some soils require special reforestation efforts. In the section "Detailed Soil Map Units," the description of each map unit in the survey area suitable for timber includes information about productivity, limitations in harvesting timber, and management concerns in producing timber. Table 7 summarizes this forestry information and rates the soils for a number of factors to be considered in management. *Slight, moderate,* and *severe* are used to indicate the degree of the major soil limitations to be considered in forest management.

Table 7 lists the *ordination symbol* for each soil. The first part of the ordination symbol, a number, indicates the potential productivity of a soil for the indicator species in cubic meters per hectare. The larger the number, the greater the potential productivity. Potential productivity is based on the site index and the point where mean annual increment is the greatest.

The second part of the ordination symbol, a letter, indicates the major kind of soil limitation affecting use and management. The letter *R* indicates a soil that has a significant limitation because of steepness of slope. The letter *X* indicates that a soil has restrictions because of stones or rocks on the surface. The letter *W* indicates a soil in which excessive water, either seasonal or year-round, causes a significant limitation. The letter *T* indicates a soil that has, within the root zone, excessive alkalinity or acidity, sodium salts, or other toxic substances that limit the development of desirable trees. The letter *D* indicates a soil that has a limitation because of a restricted rooting depth, such as a shallow soil that is underlain by hard bedrock, a hardpan, or other layers that restrict roots. The letter *C* indicates a soil that has a limitation because of the kind or amount of clay in the upper part of the profile. The letter *S* indicates a dry, sandy soil. The letter *F* indicates a soil that has a large amount of coarse fragments. The letter *A* indicates a soil having no significant limitations that affect forest use and management. If a soil has more than one limitation, the priority is as follows: R, X, W, T, D, C, S, and F.

Ratings of the *erosion hazard* indicate the probability that damage may occur if site preparation or harvesting activities expose the soil. The risk is *slight* if no particular preventive measures are needed under ordinary conditions; *moderate* if erosion-control measures are needed for particular silvicultural activities; and *severe* if special precautions are needed to control erosion for most silvicultural activities. Ratings of moderate or severe indicate the need for construction of higher standard roads, additional maintenance of roads, additional care in planning harvesting and reforestation activities, or the use of special equipment.

Ratings of *equipment limitation* indicate limits on the use of forest management equipment, year-round or seasonal, because of such soil characteristics as slope, wetness, stoniness, and susceptibility of the surface layer to compaction. As slope gradient and length increase, it becomes more difficult to use wheeled equipment. On the steeper slopes, tracked equipment is needed. On the steepest slopes, even tracked equipment cannot be operated and more sophisticated systems are needed. The rating is *slight* if equipment use is restricted by wetness for less than 2 months and if special equipment is not needed. The rating is *moderate* if slopes are so steep that wheeled equipment cannot be operated safely across the slope, if wetness restricts equipment use from 2 to 6 months per year, if stoniness restricts the use of ground-based equipment, or if special equipment is needed to prevent or minimize compaction. The rating is *severe* if slopes are so steep that tracked equipment cannot be operated safely across the slope, if wetness restricts equipment use for more than 6 months per year, if stoniness restricts the use of ground-based equipment, or if special equipment is needed to prevent or minimize compaction. Ratings of moderate or severe indicate a need to choose the best suited equipment and to carefully plan the timing of harvesting and other management activities.

Ratings of *seedling mortality* refer to the probability of the death of naturally occurring or properly planted seedlings of good stock in periods of normal rainfall, as influenced by kinds of soil or topographic features. Seedling mortality is caused primarily by too much water or too little water. The factors used in rating a soil for seedling mortality are texture of the surface layer, depth to a seasonal high water table and the length of the period when the water table is high, rock fragments in the surface layer, rooting depth, and the aspect of the slope. The mortality rate generally is highest on soils that have a sandy or clayey surface layer. The risk is *slight* if, after site preparation, expected mortality is less than 25 percent; *moderate* if expected mortality is between 25 and 50 percent; and *severe* if expected mortality exceeds 50 percent. Ratings of moderate or severe indicate that it may be necessary to use

containerized or larger than usual planting stock or to make special site preparations, such as bedding, furrowing, installing a surface drainage system, and providing artificial shade for seedlings. Reinforcement planting is often needed if the risk is moderate or severe.

Ratings of *windthrow hazard* indicate the likelihood that trees will be uprooted by the wind. A restricted rooting depth is the main reason for windthrow. The rooting depth can be restricted by a high water table, a fragipan, or bedrock, or by a combination of such factors as wetness, texture, structure, and depth. The risk is *slight* if strong winds cause trees to break but do not uproot them; *moderate* if strong winds cause an occasional tree to be blown over and many trees to break; and *severe* if moderate or strong winds commonly blow trees over. Ratings of moderate or severe indicate that care is needed in thinning or that the stand should not be thinned at all. Special equipment may be needed to prevent damage to shallow root systems in partial cutting operations. A plan for the periodic removal of windthrown trees and the maintenance of a road and trail system may be needed.

Ratings of *plant competition* indicate the likelihood of the growth or invasion of undesirable plants. Plant competition is more severe on the more productive soils, on poorly drained soils, and on soils having a restricted root zone that holds moisture. The risk is *slight* if competition from undesirable plants hinders adequate natural or artificial reforestation but does not necessitate intensive site preparation and maintenance. The risk is *moderate* if competition from undesirable plants hinders natural or artificial reforestation to the extent that intensive site preparation and maintenance are needed. The risk is *severe* if competition from undesirable plants prevents adequate natural or artificial reforestation unless the site is intensively prepared and maintained. A moderate or severe rating indicates the need for site preparation to ensure the development of an adequately stocked stand. Managers must plan site preparation measures to ensure reforestation without delays.

The *potential productivity* of *common trees* on a soil is expressed as a *site index*. Common trees are listed in the order of their observed general occurrence. Generally, only two or three tree species dominate. The first tree listed for each soil is the indicator species for that soil. An indicator species is a tree that is common in the area and that is generally the most productive on a given soil.

The *site index* is determined by taking height measurements and determining the age of selected trees within stands of a given species. This index is the average height, in feet, that the trees attain in a specified number of years. This index applies to fully stocked, even-aged, unmanaged stands. It is based on 30 years for eastern cottonwood, 35 years for American sycamore, and 50 years for all other species. The estimates of the productivity of the soils in this survey are mainly based on published data.

The *productivity class* is the yield likely to be produced by the most important trees, expressed in cubic meters per hectare per year.

Trees to plant are those that are used for reforestation or, under suitable conditions, natural regeneration. They are suited to the soils and can produce a commercial wood crop. The desired product, topographic position (such as a low, wet area), and personal preference are three factors among many that can influence the choice of trees for use in reforestation.

Recreation

In table 8, the soils of the survey area are rated according to the limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 8, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 8 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 11 and interpretations for dwellings without basements and for local roads and streets in table 10.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have gentle slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes, stones, or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

Richard W. Simmering, biologist, Natural Resources Conservation Service, helped prepare this section.

In Lincoln Parish, upland forests of mixed pines and hardwoods, bottom-land forests of hardwoods, and many scattered open areas of pasture provide habitat for a large and diverse population of wildlife. The acreage of cropland in the parish is small and insignificant as wildlife habitat.

About 30 percent of the parish is pasture. Pasture grasses include common bermudagrass, bahiagrass, and improved bermudagrass. Areas of pasture provide limited habitat, including cover and food, for mourning dove, bobwhite quail, rabbit, white-tailed deer, and many other nongame birds and animals. Pastures, occurring as small open areas in an otherwise forested environment, provide the important edge effect.

The upland forests in the parish consist of pines or mixed pines and hardwoods. Common trees are loblolly pine, shortleaf pine, white oak, southern red oak, sweetgum, elm, persimmon, water oak, and several species of hickory. The forests consisting of mixed pines and hardwoods generally support larger populations of woodland wildlife than the forests consisting of only pines.

The bottom-land hardwood forests provide the primary habitat for squirrel, deer, and wild turkey. The flood plain of the Bayou D'Arbonne is a typical example of this type of habitat. Dominant trees include beech, magnolia, cherrybark oak, swamp chestnut oak, baldcypress, water oak, shagbark hickory, and sweetgum. Areas of the hardwood forests offer excellent opportunities for deer and squirrel hunting.

The pine forests are intensively managed for pulpwood and timber. Woodland management practices, such as periodic thinning and prescribed burning, are beneficial to wildlife, especially white-tailed deer, bobwhite quail, and wild turkey. The forest industry practices even-aged management that includes block clearcutting. If clearcuts are kept relatively small, this practice is beneficial to deer, bobwhite quail, and turkey.

Farm ponds and small streams in Lincoln Parish support low to high populations of largemouth bass, bluegill, white crappie, black crappie, bowfin, channel catfish, blue catfish, pickerel, carp, shinners, and minnows. Most of the farm ponds have been stocked with bluegill, redear sunfish, and largemouth bass. Some have been stocked with channel catfish.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 9, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining

the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flooding. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, and grain sorghum.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flooding, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are bahiagrass, bermudagrass, and clover.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flooding. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are bluestem, goldenrod, beggarweed, switchgrass, and lespedeza.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of these plants are oak, cherry, sweetgum, hawthorn, dogwood, hickory, blackberry, and dewberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are red bay, red mulberry, and mayhaw.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine and cedar.

Shrubs are bushy woody plants that produce fruit, buds, twigs, bark, and foliage. Soil properties and features that affect the growth of shrubs are depth of the root zone, available water capacity, salinity, and soil moisture. Examples of shrubs are waxmyrtle, American beautyberry, and huckleberry.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, wildrice, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. Wildlife attracted to these areas include bobwhite quail, meadowlark, field sparrow, cottontail, and red fox.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, and deer.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, mink, and beaver.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the

most limiting features are identified. Ratings are given for building site development, sanitary facilities, construction materials, and water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kinds of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Table 10 shows the degree and kind of soil limitations that affect shallow excavations, dwellings without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm, dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and depth to the water table.

Dwellings and *small commercial buildings* are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrinking and swelling, and organic layers can cause the movement of footings. Depth to a high water table, depth to bedrock or to a cemented pan, large stones, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 or 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year.

They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or stabilized soil material; and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, depth to a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost action potential, and depth to a high water table affect the traffic-supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, depth to a high water table, depth to bedrock or to a cemented pan, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Table 11 shows the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 11 also shows the suitability of the soils for use as daily cover for landfill. A rating of *good* indicates that soil properties and site features are favorable for the use and that good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, depth to a high water table, depth to bedrock or to a cemented pan, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 11 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, depth to a high water table, depth to bedrock or to a cemented pan, flooding, large stones, and content of organic matter.

Excessive seepage resulting from rapid permeability in the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin

layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground-water pollution. Ease of excavation and revegetation should be considered.

The ratings in table 11 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, depth to a water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to wind erosion.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 12 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help to determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, a low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have a moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet and have a water table at a depth of less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and *gravel* are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In table 12, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable

source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable, loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal high water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and releases a variety of plant nutrients as it decomposes.

Water Management

Table 13 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas and for embankments, dikes, and levees. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives the restrictive features that affect each soil for drainage, irrigation, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and the potential for frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, or sulfur. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and

depth to bedrock or to a cemented pan. The performance of a system is affected by the depth of the root zone, the amount of salts or sodium, and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to control erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind erosion or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, toxic substances such as salts or sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classification, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 14 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under the heading "Soil Series and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system *(3)* and the system adopted by the American Association of State Highway and Transportation Officials *(2)*.

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, SP-SM.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20, or higher, for the poorest.

Rock fragments 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

Physical and Chemical Properties

Table 15 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate, or component, consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence the shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at ⅓-bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of movement of water through the soil when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage in each major soil layer is stated in inches of water per inch of soil. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, more than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion. Losses are expressed in tons per acre per year. These estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values

of K range from 0.02 to 0.69. The higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur over a sustained period without affecting crop productivity. The rate is expressed in tons per acre per year.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 15, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Table 16 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils are assigned to one of four groups. They are grouped according to the infiltration of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding, the temporary covering of the soil surface by flowing water, is caused by overflowing streams, by runoff from adjacent slopes, or by inflow from high tides. Shallow water standing or flowing for short periods after rainfall or snowmelt is not considered flooding. Standing water in swamps and marshes or in a closed depression is considered ponding.

Table 16 gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency generally is expressed as *none, rare, occasional,* or *frequent. None* means that flooding is not probable. *Rare* means that flooding is unlikely but possible under unusual weather conditions (the chance of flooding is nearly 0 percent to 5 percent in any year). *Occasional* means that flooding occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year). *Frequent* means that flooding occurs often under normal weather conditions (the chance of flooding is more than 50 percent in any year). Duration is expressed as *very brief* (less than 2 days), *brief* (2 to 7 days), *long* (7 days to 1 month), and *very long* (more than 1 month). The time of year that floods are most likely to occur is expressed in months. About two-thirds to three-fourths of all flooding occurs during the stated period.

The information on flooding is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered is local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 16 are the depth to the seasonal high water table; the kind of water table, that is, *perched* or *apparent;* and the months of the year that the water table commonly is highest. A water table that is seasonally high for less than 1 month is not indicated in table 16.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Two numbers in the column showing depth to the water table indicate the normal range in depth to a saturated zone. Depth is given to the nearest half foot. The first numeral in the range indicates the highest water level. "More than 6.0" indicates that the water table is below a depth of 6 feet or that it is within a depth of 6 feet for less than a month.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low, moderate,* or *high,* is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low, moderate,* or *high.* It is based on soil texture, acidity, and the amount of sulfates in the saturation extract.

Soil Fertility Levels

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This section contains information on the environmental factors and physical and chemical properties that affect the potential of the soils for crop production. It also lists the methods used to obtain the chemical analyses of the soils that are sampled.

Factors Affecting Crop Production

Crop composition and yield function with many environmental, plant, and soil factors. This section gives a brief description of the more important factors.

Environmental factors. The main environmental factors are intensity and duration of light, temperature of air and soil, distribution and amount of precipitation, and atmospheric carbon dioxide concentration.

Plant factors. These factors are species and hybrid -specific. They include the rate of nutrient and water uptake and the rate of growth and related plant functions.

Soil factors. These factors include both physical and chemical properties of the soils.

Physical properties. These are distribution, texture, structure, surface area, bulk density, water retention and flow, and aeration.

Chemical properties (soil fertility factors). The quantity of the chemical element, its intensity, the relationship of quantity and intensity, and the rate of replenishment of the elements to the soils are the factors of chemical properties. They affect crop growth.

Quantity factor. The quantity factor refers to the concentration of a nutrient ion adsorbed or held in exchangeable form on the solid phase of the soil. This form of nutrient ion also is available for plant uptake.

Intensity factor. The intensity factor refers to the concentration of a nutrient ion in soil solution. Because plant roots absorb nutrients directly from soil solution, this factor quantifies the amount of a nutrient element immediately available for plant uptake.

Quantity/intensity relationship factor. The relationship between the quantity and intensity factors is sometimes called the buffer power. As plant roots absorb nutrients from soil solution, the concentration in solution is replenished by ions from the solid phase. If two soils have identical intensity factors, the soil having the greater quantity factor will provide more nutrients during the growing season because it can maintain the intensity factor level for a longer period.

Replenishment factor. This is the rate of replenishment of the available supply of nutrients in the solid and solution phases by weathering reactions, fertilizer additions, and transport by mass flow and diffusion.

These factors are interdependent. The magnitude of the factors and the interactions among them control crop response. The relative importance of each factor changes from soil to soil, crop to crop, and environment to environment. The soil factors are only part of the overall system.

Soil testing provides information for a soil and crop management program that establishes and maintains optimum levels and balance of the essential elements in soil for crop and animal nutrition and protects the environment against the buildup of potentially toxic levels of essential and nonessential elements. Current soil tests measure the available supply of one or more nutrients in the plow layer. The available supply consists of nutrients characterized by both the intensity and quantity factors. If the available supply of one or more nutrients clearly limits crop production, existing soil tests can generally diagnose the problem and suggest reliable recommendations. Soil management systems are generally based on the physical and chemical alteration of the plow layer. Characteristics of

this layer can vary from one location to another, depending upon management practices and soil use.

Alteration of the plow layer produces little change in the subsurface horizons or changes them very slowly. These horizons reflect the soil's inherent ability to supply nutrients to plant roots and to provide a favorable environment for root growth. If soil fertility recommendations based on current soil tests are followed, major fertility problems in the plow layer are normally corrected. Other limitations for crop production are crop and environmental factors, physical properties of the plow layer, and physical and chemical properties of the subsoil.

Chemical Analysis Methods

Information on the available nutrient supply in the subsoil allows evaluation of the natural fertility levels of the soil. Soil profiles were sampled during the soil survey and analyzed for reaction; organic matter; extractable phosphorus; exchangeable cations of calcium, magnesium, potassium, sodium, aluminum, and hydrogen; total acidity; and cation-exchange capacity. These results are summarized in table 17. More detailed information on the chemical analysis of soils is available *(1, 4, 5, 6, 9, 10, 11, 12, 13, 16, 17, 21, 23)*. The methods used to obtain the data are listed below. The codes in parentheses refer to published methods *(21)*.

pH—1:1 soil/water solution (8C1a).
Organic carbon—acid-dichromate oxidation (6A1a).
Extractable phosphorus—Bray 2 extractant (0.03 molar ammonium fluoride-0.1 molar hydrochloric acid).
Exchangeable cations—pH 7, 1 molar ammonium acetate-calcium (6N2), magnesium (6O2), potassium (6Q2), sodium (6P2).
Exchangeable aluminum and hydrogen—1 molar potassium chloride (6G2).
Total acidity—pH 8.2, barium chloride-triethanolamine (6H1a).
Sum cation-exchange capacity—sum of bases plus total acidity (5A3a).
Effective cation-exchange capacity—sum of bases plus exchangeable aluminum and hydrogen (5A3b).
Base saturation—sum of cations/sum cation-exchange capacity (5C3).
Exchangeable sodium percentage—exchangeable sodium/sum cation-exchange capacity.
Aluminum saturation—exchangeable aluminum/effective cation-exchange capacity.

Characteristics of Soil Fertility

In general, four major types of nutrient distribution in soils of Louisiana can be identified. The first type includes soils that have relatively high levels of available nutrients throughout the profile. This type reflects the relatively high fertility status of the parent material from which the soils developed and a relatively young age or a less intense degree of weathering of the soil profile. No soils of this type are in Lincoln Parish.

The second type includes soils that have relatively low levels of available nutrients in the surface layer, but these levels generally increase with increasing depth through the soil profile. These soils have relatively fertile parent material but are older soils that have been subjected either to weathering over a longer period of time or to more intense weathering. If the levels of available nutrients in the surface layer are low, crops may exhibit deficiency symptoms early in the growing season. Deficiency symptoms often disappear if crop roots are able to penetrate to the more fertile subsoil as the growing season progresses. Angie, Cahaba, Darbonne, Darley, Mahan, McLaurin, and Sacul soils are of this type.

The third type includes soils that have adequate or relatively high levels of available nutrients in the surface layer but have relatively low levels in the subsoil. Such soils developed from parent material with low fertility, or they are older soils that have been subjected to more intense weathering over a longer period time. The higher nutrient levels in the surface layer generally are a result of fertilization in agricultural soils or biocycling in undisturbed soils. Bowie, Dela, Gurdon, luka, and Trep soils are of this type.

The fourth type includes soils that have relatively low levels of available nutrients throughout. These soils developed from parent material with low fertility, or they are older soils that have been subjected to intense weathering over a long period of time. Neither fertilization nor biocycling has contributed to nutrient levels in the surface layer of these soils. Betis soils are of this type.

Soil reaction and acidity, organic matter content, sodium content, and cation-exchange capacity can also show the general nutrient distribution patterns in soils. These distributions are the result of the interactions of parent material, weathering (climate), time, and, to a lesser extent, organisms and topography.

Nitrogen. Generally, more than 90 percent of the nitrogen in the surface layer is organic nitrogen. Most of the nitrogen in the subsoil is fixed ammonium nitrogen. Although these forms of nitrogen are unavailable for plant uptake, they can be converted to readily available ammonium and nitrate species.

Nitrogen generally is the most limiting nutrient element in crop production because plants have a high demand of it. Nitrogen fertilizer recommendations in the survey area are nearly always based on the nitrogen requirement of the crop rather than nitrogen soil test

levels, since no reliable nitrogen soil tests have been developed for Louisiana soils.

The status of nitrogen fertility in the soil can be estimated from the amount of readily available ammonium and nitrate nitrogen in the soil, the amount of organic nitrogen, the rate of mineralization of organic nitrogen to available forms of inorganic nitrogen, and the rate of conversion of fixed ammonium nitrogen to available forms of nitrogen. Because the amounts and rates of transformation of the various forms of nitrogen in the soils of Lincoln Parish have not been determined, the nitrogen fertility status cannot be assessed. However, fertilizer nitrogen recommendations obtained from the Louisiana Cooperative Extension Service may be used to determine application rates.

Phosphorus. Phosphorus occurs in soils as inorganic phosphorus in soil solution; as discrete minerals, such as hydroxyapatite, variscite, and strengite; as occluded or coprecipitated phosphorus in other minerals; as phosphorus retained on the surfaces of minerals, such as carbonates, metal oxides, and layer silicates; and in organic compounds. Concentrations of phosphorus in soil solution are generally low. Because plant roots mainly obtain phosphorus from the soil solution, the plant uptake of phosphorus depends on the ability of the phosphorus in soil solid phase to maintain the phosphorus concentration in soil solution. Soil test procedures measure soil solution phosphorus and the readily available solid phase phosphorus that buffers the solution phase concentration.

The Bray 2 extractant tends to extract more phosphorus than the commonly used Bray 1, Mehlich 1, and Olsen extractants *(5, 10, 12)*. The Bray 2 extractant provides an estimate of the readily available and the slowly available supplies of phosphorus in the soil. In most of the soils in Lincoln Parish, the content of Bray 2 extractable phosphorus is uniformly low throughout, except where additions of phosphorus fertilizer have raised the level of extractable phosphorus in the surface layer. These low levels of available phosphorus limit crop production. Continual additions of phosphorus fertilizer are needed to build up and maintain adequate levels of available phosphorus for sustained crop production.

Potassium. Potassium exists in four major forms in soils: soil solution potassium, exchangeable potassium associated with negatively charged sites on clay mineral surfaces, nonexchangeable potassium trapped between clay mineral interlayers, and structural potassium within the crystal lattice of minerals. Exchangeable potassium in soils can be replaced by other cations and is generally readily available for plant uptake. To become available to plants, nonexchangeable potassium and structural potassium must be converted to exchangeable potassium through weathering reactions.

The content of exchangeable potassium in soils is an estimate of the supply available to plants. The available supply of potassium in most of the soils of Lincoln Parish is very low or low throughout the soil profile. In some soils, such as Sacul soils, it increases slightly with increasing depth and as the content of clay increases. Low levels of exchangeable potassium indicate a general lack of micaceous minerals, which are a source of exchangeable potassium during the process of weathering.

On soils that have very low or low levels of exchangeable potassium, crops respond well to potassium fertilizer. On soils that have enough clay to hold the potassium, low levels can be gradually built up by additions of potassium fertilizer. Exchangeable potassium levels can be maintained by adding enough potassium fertilizer to account for the amount removed by crops, for fixation of exchangeable potassium to nonexchangeable potassium, and for leaching losses. The soils in Lincoln Parish that have a sandier texture, such as Betis and Trep soils, do not have a sufficient amount of clay to hold the potassium. Therefore, these soils do not have a cation-exchange capacity high enough to maintain adequate quantities of available potassium for sustained crop production. In areas of these soils, more frequent additions of potassium are needed to balance the amount of potassium lost through leaching.

Magnesium. Magnesium exists in soil solution, as exchangeable magnesium associated with negatively charged sites on clay mineral surfaces, and as structural magnesium in mineral crystal lattices. Solution magnesium and exchangeable magnesium generally are readily available for plant uptake, but structural magnesium must be converted to exchangeable magnesium during mineral weathering reactions.

According to guidelines for soil test interpretations, the content of exchangeable magnesium in the soils in Lincoln Parish is low, medium, or high, depending on the soil texture. Low levels of exchangeable magnesium occur throughout most of the soil profile in such soils as Betis soils. Angie, Darley, and Mahan soils have low levels in the upper part and medium or high levels in the lower part. Levels vary throughout the profile in Cahaba and Dela soils. Medium or high levels occur throughout Ouachita and Sacul soils. Higher levels of exchangeable magnesium in certain soil horizons are generally associated with a higher content of clay in those horizons.

The levels of exchangeable magnesium in most of the soils in Lincoln Parish are more than adequate for crop production, especially where the plant roots can exploit the high levels in the subsoil. Because

magnesium deficiencies in plants are normally rare, fertilizer sources of magnesium are generally not needed for crop production.

Calcium. Calcium exists in soil solution, as exchangeable calcium associated with negatively charged sites on clay mineral surfaces, and as structural calcium in mineral crystal lattices. Exchangeable calcium generally is available for plant uptake, but structural calcium is not.

Calcium deficiencies in plants are extremely rare. Calcium is normally included with the material added to soils when lime is applied for the correction of acidity problems.

Some soils in Lincoln Parish, such as Bowie, Cahaba, and McLaurin soils, have low levels of calcium in the upper part and medium or high levels in the lower part. Other soils, such as Iuka and Ouachita soils, have varying levels throughout. Higher levels of exchangeable calcium in the surface layer are normally associated with a soil reaction that is higher than that in the subsoil, and they are probably the result of applications of lime. Exchangeable calcium levels that are higher in the subsoil than in the surface layer generally are associated with a higher content of clay in the subsoil.

Calcium is normally the most abundant exchangeable cation in soils. In Angie, Darley, Gurdon, Ouachita, and Sacul soils, however, the exchangeable magnesium levels in the subsoil are greater than the exchangeable calcium levels. In other soils, the exchangeable calcium levels are greater than, or about the same as, the exchangeable magnesium levels.

Organic matter. The organic matter content in a soil greatly influences other soil properties. High organic matter content in mineral soils is desirable, and low organic matter content can lead to many problems. Increasing the organic matter content can greatly improve soil structure, drainage, and other physical properties. It can also increase the available water capacity, the cation-exchange capacity, and the content of nitrogen.

Increasing the organic matter content is very difficult because organic matter is continually subject to microbial degradation, especially in Louisiana, where higher soil temperatures and higher water content increase microbial activity. The rate at which organic matter in native plant communities breaks down is balanced by the rate at which fresh material is added. Disruption of this natural process can lead to a decline in the organic matter content. Management practices that cause erosion lead to a further decrease.

Even if no degradation of organic matter occurs, 10 tons of organic matter is needed to raise the organic matter content in the upper 6 inches of soil by just 1 percent. Since breakdown of organic matter does occur in the soil, large amounts must be added for several decades before a small increase in the content can be achieved. Conservation tillage and cover crops can slowly increase the organic matter content over time or at least prevent further decrease.

The organic matter content in the soils in Lincoln Parish is low. It decreases sharply with increasing depth because additions of fresh organic matter are confined to the surface layer. These low levels reflect a high rate of organic matter degradation, erosion, and cultural practices that make maintenance of a higher content of organic matter difficult.

Sodium. Sodium exists in soil solution, as exchangeable sodium associated with negatively charged sites on clay mineral surfaces, and as structural sodium in mineral crystal lattices. Because sodium is readily soluble and generally is not strongly retained by soils, well drained soils that are subject to moderate or high rainfall normally do not have significant amounts of sodium. Soils in low rainfall environments, soils that have restricted drainage in the subsoil, and soils of the coastal marshes may have significant amounts of sodium. High levels of exchangeable sodium in soils are associated with undesirable physical properties, such as poor structure, slow permeability, and restricted drainage.

None of the soils in Lincoln Parish has more exchangeable sodium than exchangeable potassium, and none has excessive levels of exchangeable sodium. Levels of exchangeable sodium in the soils that are higher than normal are associated with restricted drainage in the subsoil. Levels of exchangeable sodium that make up more than 6 percent of the sum of the cation-exchange capacity in the rooting depth of summer annuals can create undesirable physical properties in soils, such as surface crusting, dispersion of soil particles, low rates of water infiltration, and low hydraulic conductivity.

Exchangeable aluminum, exchangeable hydrogen, pH, exchangeable acidity, and *total acidity.* The pH of the soil solution in contact with the soil affects other soil properties. Soil pH is an intensity factor rather than a quantity factor. The lower the pH, the more acidic the soil. Soil pH controls the availability of essential and nonessential elements by controlling mineral solubility, ion exchange, and adsorption and desorption reactions with soil surfaces. It also affects microbial activity.

Aluminum occurs in soils as exchangeable polymeric hydrolysis species, aluminum oxides, and aluminosilicate minerals. Exchangeable aluminum in soils is determined by extraction with neutral salts, such as potassium chloride and barium chloride. The exchangeable aluminum in soils is directly related to

pH. If pH is less than 5.5, the soils have significant amounts of exchangeable aluminum that has a charge of plus 3. This species of aluminum is toxic to plants. The toxic effects of aluminum on plant growth can be alleviated by adding lime to convert exchangeable aluminum to nonexchangeable polymeric hydrolysis species. High levels of organic matter can also alleviate aluminum toxicity.

Sources of exchangeable hydrogen in soils include hydrolysis of exchangeable and nonexchangeable aluminum and pH-dependent exchange sites on metal oxides, certain layer silicates, and organic matter. As determined by extraction with such neutral salts as potassium chloride, exchangeable hydrogen is normally not a major component of soil acidity because the hydrogen is not readily replaced by other cations unless accompanied by a neutralization reaction. Most of the neutral salt exchangeable hydrogen in soils apparently results from aluminum hydrolysis.

Acidity from hydrolysis of neutral salt exchangeable aluminum plus neutral salt exchangeable hydrogen from pH-dependent exchange sites makes up the exchangeable acidity in soils. Exchangeable acidity is determined by soil pH. Titratable acidity is the amount of acidity neutralized to a selected pH, generally 7 or 8.2, and constitutes the total potential acidity of a soil. All sources of soil acidity, including hydrolysis of monomeric and polymeric aluminum species and hydrogen from pH-dependent exchange sites on metal oxides, layer silicates, and organic matter, contribute to the total potential acidity. Total potential acidity in soils is determined by titration with bases or incubation with lime; extraction with a buffered extractant followed by titration of the buffered extractant (pH 8.2, barium chloride-triethanolamine method); or equilibration with buffers followed by estimation of acidity from changes in buffer pH.

Most of the soils in Lincoln Parish have a low pH, significant quantities of exchangeable aluminum, and high levels of total acidity in many horizons. Examples are Angie, Bowie, and Gurdon soils. High levels of exchangeable aluminum are a major limitation affecting crop production. The high levels can be reduced in the surface layer by adding lime, but no economical methods are presently available to neutralize acidity below the surface layer. Exchangeable aluminum levels below the surface layer can be reduced somewhat by applying gypsum so that the calcium leaches through the soil and replaces the exchangeable aluminum.

Cation-exchange capacity. The cation-exchange capacity represents the amount of nutrient and nonnutrient cations that a soil can hold in an exchangeable form. It depends on the number of negatively charged sites, both permanent and pH dependent, that are present in the soil. Permanent charge cation-exchange sites occur because a net negative charge develops on a mineral surface from substitution of ions within the crystal lattice. A negative charge develops from ionization of surface hydroxyl groups on minerals. Organic matter also produces pH-dependent cation-exchange sites.

Methods for determining cation-exchange capacity are available and can be classified as one of two types: methods that use unbuffered salts to measure the cation-exchange capacity at the pH of the soil and methods that use buffered salts to measure the cation-exchange capacity at a specified pH. These methods produce different results since the unbuffered salt methods include only a part of the pH-dependent cation-exchange capacity and the buffered salt methods include all of the pH-dependent cation-exchange capacity up to the pH of the buffer (pH 7 or 8.2). Errors in the saturation, washing, and replacement steps can also cause different results.

The effective cation-exchange capacity is the sum of exchangeable bases (calcium, magnesium, potassium, and sodium) determined by extraction with 1 molar ammonium acetate at pH 7 plus the sum of neutral salt exchangeable aluminum and hydrogen (exchangeable acidity). The sum cation-exchange capacity is the sum of exchangeable bases plus the total acidity determined by extraction with pH 8.2, barium chloride-triethanolamine. The effective cation-exchange capacity is generally less than the sum cation-exchange capacity and includes only that part of the pH-dependent cation-exchange capacity that is determined by exchange of hydrogen with a neutral salt. The sum cation-exchange capacity includes all of the pH-dependent cation-exchange capacity up to pH 8.2. If a soil contains no pH-dependent exchange sites or the soil pH is about 8.2, the effective and sum cation-exchange capacities will be about the same. The larger the cation-exchange capacity, the larger the capacity to store nutrient cations.

The pH-dependent charge is a significant source of the cation-exchange capacity in most of the soils in Lincoln Parish. Because the pH-dependent cation-exchange capacity increases as pH increases, the cation-exchange capacity of many of the soils can be increased by adding lime. Increased cation-exchange capacities result in a greater storage capacity for nutrient cations, such as potassium, magnesium, and calcium.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories *(20)*. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or on laboratory measurements. Table 18 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Eleven soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Entisol.

SUBORDER. Each order is divided into suborders, primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Fluvent (*Fluv*, meaning river, plus *ent*, from Entisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Udifluvents (*Ud*, meaning humid, plus *fluvent*, the suborder of the Entisols that is on river flood plains in a humid climate).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Udifluvents.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is coarse-loamy, siliceous, nonacid, thermic Typic Udifluvents.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. There can be some variation in the texture of the surface layer or of the substratum within a series.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. The soil is compared with similar soils and with nearby soils of other series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the "Soil Survey Manual" *(22)*. Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" *(20)*. Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

Angie Series

The Angie series consists of moderately well drained, slowly permeable soils that formed in loamy and clayey sediments of Tertiary age. These soils are on uplands.

Slopes range from 1 to 3 percent.

Soils of the Angie series are clayey, mixed, thermic Aquic Paleudults.

Angie soils are near Bowie and Sacul soils. Bowie soils are at the higher elevations. They are loamy throughout. Sacul soils are at the lower elevations. They have a content of clay in the subsoil that decreases by more than 20 percent within a depth of 60 inches.

Typical pedon of Angie very fine sandy loam, 1 to 3 percent slopes; 1.7 miles northeast of Ruston, 4,180 feet north and 500 feet east of the southwest corner of sec. 18, T. 18 N., R. 2 W.

A—0 to 6 inches; dark yellowish brown (10YR 4/4) very fine sandy loam; weak fine granular structure; very friable; common fine and medium roots; few fine pores; very strongly acid; clear smooth boundary.

E—6 to 12 inches; yellowish brown (10YR 5/4) very fine sandy loam; weak fine subangular blocky structure; very friable; common fine and medium roots; few fine pores; very strongly acid; clear smooth boundary.

Bt1—12 to 25 inches; strong brown (7.5YR 5/6) silty clay loam; weak medium subangular blocky structure; friable; common fine and medium roots; few medium pores; common distinct clay films on faces of peds; very strongly acid; clear wavy boundary.

Bt2—25 to 39 inches; yellowish brown (10YR 5/6) silty clay; many medium prominent reddish brown (2.5YR 5/4) and few fine distinct light brownish gray (10YR 6/2) mottles; moderate medium subangular blocky structure; firm; few fine roots; common distinct clay films on faces of peds; very strongly acid; clear wavy boundary.

Bt3—39 to 57 inches; yellowish brown (10YR 5/4) silty clay; many medium prominent red (2.5YR 4/8) and common medium distinct light brownish gray (10YR 6/2) mottles; weak medium subangular blocky structure; firm; few fine roots; few medium pores; common distinct clay films on faces of peds; very strongly acid; gradual wavy boundary.

Btg—57 to 70 inches; light brownish gray (10YR 6/2) silty clay; common medium prominent red (2.5YR 4/8) and yellowish brown (10YR 5/8) and few fine prominent brownish yellow (10YR 6/8) mottles; weak medium subangular blocky structure; firm; few fine roots; few fine pores; few faint clay films on faces of peds; very strongly acid.

The thickness of the solum ranges from 60 to 90 inches. Fragments of ironstone make up 0 to 20 percent, by volume, of the solum. In at least one subhorizon within a depth of 30 inches, exchangeable aluminum makes up 50 percent or more of the effective cation-exchange capacity.

The A horizon has value of 3 to 6 and chroma of 1 to 4. It is 3 to 9 inches thick. Reaction ranges from very strongly acid to slightly acid.

The E horizon has value of 4 to 6 and chroma of 2 to 4. It is fine sandy loam, very fine sandy loam, or silt loam. Reaction ranges from very strongly acid to slightly acid.

The Bt horizon has value of 4 to 6 and chroma of 4 to 8. In some pedons it has hue of 2.5Y in the lower part. The number of grayish mottles is few or common within a depth of 30 inches below the surface. The number of reddish or yellowish mottles ranges from few to many in the lower part of the horizon. The horizon is silty clay loam, clay loam, silty clay, or clay. Reaction ranges from extremely acid to medium acid.

The Btg horizon has colors in shades of gray and mottles in shades of brown or red. It is silty clay loam, clay loam, silty clay, or clay. Reaction ranges from extremely acid to medium acid.

Betis Series

The Betis series consists of somewhat excessively drained, rapidly permeable soils that formed in sandy sediments of Tertiary age. These soils are on uplands. Slopes range from 1 to 12 percent.

Soils of the Betis series are sandy, siliceous, thermic Psammentic Paleudults.

Betis soils commonly are near Briley, McLaurin, and Trep soils. The nearby soils are at the slightly lower elevations. They have a sandy surface layer and subsurface layer and a loamy subsoil.

Typical pedon of Betis loamy fine sand, 1 to 5 percent slopes; 1.4 miles southeast of Grambling, 4,330 feet north and 1,800 feet east of the southwest corner of sec. 32, T. 18 N., R. 3 W.

A—0 to 8 inches; brown (10YR 5/3) loamy fine sand; weak fine granular structure; very friable; common fine and medium roots; strongly acid; clear wavy boundary.

E—8 to 22 inches; light yellowish brown (10YR 6/3) loamy fine sand; single grained; very friable; common fine and medium roots; medium acid; gradual wavy boundary.

Bw—22 to 47 inches; strong brown (7.5YR 5/6) loamy fine sand; single grained; very friable; few fine and medium roots; few pockets of uncoated sand grains; strongly acid; gradual wavy boundary.

E/B—47 to 76 inches; pale brown (10YR 6/3) fine sand (E) and yellowish red (5YR 4/6) loamy fine sand (Bt); lamellae 0.1 to 0.25 inch thick and 2 to 4 inches apart; weak coarse subangular blocky

structure; very friable; lamellae coating sand grains and clay bridges; strongly acid.

The thickness of the solum ranges from 60 to 80 inches. Reaction generally ranges from very strongly acid to medium acid throughout the profile. The surface layer can be slightly acid where lime has been added. The particle-size control section is loamy fine sand or fine sand. In at least one subhorizon within a depth of 30 inches, exchangeable aluminum makes up 20 to 50 percent of the effective cation-exchange capacity.

The A horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 2 to 4. It is 4 to 12 inches thick.

The E horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 3 or 4. It is loamy fine sand or fine sand. The horizon is 13 to 30 inches thick.

The Bw horizon has hue of 5YR, 7.5YR, or 10YR and chroma of 6 to 8. The number of spots or pockets and streaks of uncoated sand grains is few or common.

The E part of the E/B horizon has value of 5 to 7 and chroma of 3 or 4. The Bt part (lamellae) has hue of 5YR, value of 4 or 5, and chroma of 6 to 8, or it has hue of 7.5YR or 10YR, value of 5, and chroma of 6 to 8. The lamellae are loamy fine sand or fine sandy loam. In some pedons the Bt part consists of continuous loamy fine sand rather than lamellae.

Bowie Series

The Bowie series consists of moderately well drained, moderately slowly permeable soils that formed in loamy sediments mainly of Tertiary age. These soils are on uplands. Slopes range from 1 to 8 percent.

Soils of the Bowie series are fine-loamy, siliceous, thermic Plinthic Paleudults.

Bowie soils are near Angie, Briley, Sacul, and Trep soils. Angie and Sacul soils have more than 35 percent clay in the upper 20 inches of the argillic horizon. They are at the slightly lower elevations and in landscape positions similar to those of the Bowie soils. Briley and Trep soils have a sandy epipedon that is 20 to 40 inches thick. Briley soils are on ridges at high elevations. Trep soils are in landscape positions similar to those of the Bowie soils.

Typical pedon of Bowie fine sandy loam, 1 to 5 percent slopes; 2.2 miles southeast of Hico, 2,350 feet north and 4,200 feet east of the southwest corner of sec. 9, T. 20 N., R. 3 W.

Ap—0 to 7 inches; dark brown (10YR 4/3) fine sandy loam; weak fine granular structure; very friable; common fine and medium roots; extremely acid; clear smooth boundary.

E—7 to 13 inches; yellowish brown (10YR 5/4) fine sandy loam; weak medium platy structure; very friable; common fine and few medium roots; common medium tubular pores; very strongly acid; clear smooth boundary.

Bt1—13 to 27 inches; strong brown (7.5YR 5/8) sandy clay loam; weak coarse prismatic structure parting to moderate medium subangular blocky; friable; common fine roots; many fine tubular pores; common distinct clay films on faces of peds; very strongly acid; clear smooth boundary.

Bt2—27 to 44 inches; yellowish brown (10YR 5/8) sandy clay loam; few medium prominent red (2.5YR 4/8) mottles; weak coarse prismatic structure parting to moderate medium subangular blocky; friable; common fine roots; common medium tubular pores; common distinct clay films on faces of some peds; about 2 percent plinthite nodules less than 0.25 inch in diameter; very strongly acid; clear wavy boundary.

Btv—44 to 55 inches; yellowish brown (10YR 5/6) sandy clay loam; common medium prominent red (2.5YR 4/8), common medium prominent gray (10YR 6/1), and few fine distinct strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; firm, slightly brittle; common fine roots; common medium tubular pores; few faint clay films on vertical faces of some peds; about 6 percent plinthite nodules; strongly acid; clear wavy boundary.

B/E—55 to 67 inches; yellowish brown (10YR 5/6) sandy clay loam (Bt); many coarse prominent red (2.5YR 4/8) and common medium prominent gray (10YR 6/1) mottles; moderate medium subangular blocky structure; firm, slightly brittle; few faint clay films on faces of some peds; about 10 percent gray (10YR 6/1) sandy clay loam (E); about 6 percent plinthite nodules; extremely acid; clear wavy boundary.

B't—67 to 85 inches; mottled yellowish brown (10YR 5/6), red (2.5YR 4/8), and gray (10YR 6/1) sandy clay loam; weak medium subangular blocky structure; firm; few faint clay films on faces of some peds; extremely acid.

The thickness of the solum ranges from 60 to more than 85 inches. The depth to horizons that contain more than 5 percent plinthite ranges from 25 to 60 inches. In at least one subhorizon within a depth of 30 inches, exchangeable aluminum makes up 20 to 50 percent of the cation-exchange capacity.

The Ap horizon has value of 4 or 5 and chroma of 2 or 3. It is 2 to 8 inches thick. Reaction ranges from extremely acid to slightly acid.

The E horizon has hue of 10YR or 7.5YR, value of 4

to 6, and chroma of 3 to 5. Reaction ranges from very strongly acid to slightly acid. The texture is loamy fine sand or fine sandy loam.

The Bt and Btv horizons and the Bt part of the B/E horizon have hue of 7.5YR or 10YR, value of 5 or 6, or chroma of 4 to 8. The number of red or yellowish red mottles in the Bt horizon ranges from none to common. The number of mottles in shades of red, gray, or brown in the Btv horizon ranges from few to many. The content of plinthite, mainly in nodular form, makes up about 5 to 15 percent of the Btv horizon. The Bt and Btv horizons are sandy clay loam, fine sandy loam, loam, or clay loam. Reaction ranges from extremely acid to strongly acid.

The B′t or BC horizon, if it occurs, has colors in shades of brown or gray and has yellowish or reddish mottles, or it has a matrix that is mottled or stratified with these colors. In some pedons lenses or interfingers of uncoated sand make up as much as 4 percent of the volume in the E material. The content of plinthite ranges from 0 to 4 percent, by volume. The texture is sandy clay loam, clay loam, or sandy clay. Some pedons have strata of fine sandy loam or clay. Reaction ranges from extremely acid to strongly acid.

Briley Series

The Briley series consists of well drained soils that formed in sandy and loamy sediments mainly of Tertiary age. These soils are on uplands. Permeability is rapid in the upper part of the soils and moderate in the lower part. Slopes range from 1 to 5 percent.

Soils of the Briley series are loamy, siliceous, thermic Arenic Paleudults.

Briley soils are near Bowie, McLaurin, and Trep soils. The nearby soils are at the slightly lower elevations. Bowie and McLaurin soils do not have a sandy epipedon more than 20 inches thick. Trep soils are clayey in the lower part of the subsoil.

Typical pedon of Briley loamy fine sand, 1 to 5 percent slopes; 0.2 mile west of Unionville, 4,380 feet north and 3,400 feet east of the southwest of corner sec. 2, T. 19 N., R. 3 W.

Ap—0 to 7 inches; dark brown (10YR 4/3) loamy fine sand; weak fine granular structure; very friable; many fine and medium roots; strongly acid; abrupt smooth boundary.

E1—7 to 15 inches; brown (10YR 5/3) loamy fine sand; weak fine subangular blocky structure; very friable; common fine roots; common fine pores; dark brown (10YR 4/3) material occurring in root channels and as wormcasts; strongly acid; gradual wavy boundary.

E2—15 to 27 inches; yellowish brown (10YR 5/4) loamy fine sand; weak medium subangular blocky structure; very friable; common medium roots; common fine pores; medium acid; clear smooth boundary.

Bt1—27 to 38 inches; yellowish red (5YR 4/6) sandy clay loam; moderate medium subangular blocky structure; friable; few fine roots; common fine tubular pores; common distinct clay films on faces of peds; strongly acid; clear smooth boundary.

Bt2—38 to 67 inches; yellowish red (5YR 5/8) sandy clay loam; moderate medium subangular blocky structure; friable; few fine roots; few faint clay films on faces of some peds; strongly acid; clear smooth boundary.

Bt3—67 to 85 inches; strong brown (7.5YR 5/6) sandy clay loam; common medium distinct gray (10YR 6/1) and common medium prominent red (2.5YR 4/8) mottles; moderate medium subangular blocky structure; firm; few faint clay films on faces of some peds; medium acid.

The solum is more than 65 inches thick. In at least one subhorizon within a depth of 30 inches, exchangeable aluminum makes up 20 to 50 percent of the effective cation-exchange capacity.

The Ap horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2 to 4. Reaction ranges from very strongly acid to slightly acid. The horizon is 4 to 10 inches thick.

The E horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 or 4. Reaction ranges from very strongly acid to slightly acid. The horizon is 10 to 30 inches thick.

The Bt horizon has hue of 7.5YR, 2.5YR, or 5YR, value of 4 or 5, and chroma of 6 to 8. It has hue of 7.5YR only in the lower part. The number of mottles in shades of red, brown, gray, or yellow ranges from none to common, but gray mottles occur only in the lower part. In some pedons the lower part has a mottled matrix of these colors. The horizon is fine sandy loam, loam, or sandy clay loam. Reaction ranges from very strongly acid to medium acid.

Cahaba Series

The Cahaba series consists of well drained, moderately permeable soils that formed in sandy and loamy sediments of late Pleistocene age. These soils are on stream terraces. Slopes range from 1 to 3 percent.

Soils of the Cahaba series are fine-loamy, siliceous, thermic Typic Hapludults.

Cahaba soils are similar to McLaurin soils and are near Dela, Dubach, Guyton, Iuka, and Ouachita soils. Dela, Guyton, Iuka, and Ouachita soils are on flood

plains. Dela and Iuka soils are coarse-loamy. Guyton and Ouachita soils are fine-silty. Dubach and McLaurin soils have a solum that is thicker than that of the Cahaba soils. Dubach soils are in landscape positions similar to those of the Cahaba soils. McLaurin soils are on uplands.

Typical pedon of Cahaba fine sandy loam, 1 to 3 percent slopes; 3.3 miles east of Dubach, 2,550 feet north and 2,180 feet east of the southwest corner of sec. 30, T. 20 N., R. 2 W.

A—0 to 8 inches; dark brown (10YR 4/3) fine sandy loam; weak fine granular structure; very friable; many fine and medium roots; strongly acid; clear smooth boundary.

A/B—8 to 15 inches; yellowish brown (10YR 5/4) (A) and yellowish red (5YR 5/6) (B) fine sandy loam; weak medium subangular blocky structure; very friable; few medium and common fine roots; many fine tubular pores; medium acid; clear smooth boundary.

Bt1—15 to 24 inches; yellowish red (5YR 5/6) sandy clay loam; weak coarse prismatic structure parting to moderate medium subangular blocky; friable; many fine and common medium roots; common medium tubular pores; common distinct clay films on faces of peds; strongly acid; gradual wavy boundary.

Bt2—24 to 40 inches; red (2.5YR 4/6) sandy clay loam; moderate medium subangular blocky structure; friable; few fine roots; common fine tubular pores; common distinct clay films on faces of peds; light yellowish brown (10YR 6/4) pockets of sand in the lower part; strongly acid; gradual wavy boundary.

Bt3—40 to 48 inches; yellowish red (5YR 5/6) sandy clay loam; weak medium subangular blocky structure; friable; common medium prominent light yellowish brown (10YR 6/4) coatings on sand; common medium prominent yellowish brown (10YR 5/6) mottles; common distinct clay films on faces of some peds; strongly acid; clear wavy boundary.

C1—48 to 61 inches; yellowish brown (10YR 5/6) loamy sand; few medium faint brownish yellow (10YR 6/6) mottles; massive; very friable; strongly acid; gradual wavy boundary.

C2—61 to 73 inches; strong brown (7.5YR 5/6) loamy sand; single grained; loose; few small pockets of uncoated pale brown (10YR 6/3) sand grains; strongly acid.

The thickness of the solum ranges from 36 to 60 inches. Reaction ranges from very strongly acid to medium acid throughout the profile.

The A horizon has value of 3 to 5 and chroma of 2 to 4. It is 4 to 8 inches thick.

The E horizon, if it occurs, has hue of 10YR, value of 5 or 6, and chroma of 2 to 4.

The Bt horizon has value of 4 or 5 and chroma of 6 to 8. It is sandy clay loam, loam, or clay loam.

The BC horizon, if it occurs, has the same colors as the Bt horizon. In some pedons it is mottled in shades of yellow and brown. It is fine sandy loam or sandy loam.

The C horizon has hue of 2.5YR, 5YR, 7.5YR, and 10YR, value of 4 or 5, and chroma of 4 to 8. In some pedons it is stratified. The texture is sand, loamy sand, or fine sandy loam. In some pedons the C horizon has few or common flakes of mica.

Darbonne Series

The Darbonne series consists of well drained, moderately slowly permeable soils that formed in iron-rich, loamy and sandy marine sediments of Tertiary age. These soils are on uplands. Slopes range from 1 to 5 percent.

Soils of the Darbonne series are fine-loamy, siliceous, thermic Typic Paleudalfs.

Darbonne soils are near Darley and Mahan soils. The nearby soils are on side slopes and in landscape positions similar to those of the Darbonne soils. They have a clayey subsoil.

Typical pedon of Darbonne loamy fine sand, 1 to 5 percent slopes; 2.75 miles northwest of Cross Roads, 4,820 feet north and 2,000 feet east of the southwest corner of sec. 29, T. 20 N., R. 5 W.

A—0 to 5 inches; dark grayish brown (10YR 4/2) loamy fine sand; weak fine granular structure; very friable; common fine and medium and few coarse roots; about 10 percent small angular, flattened, and slightly rounded fragments of ironstone, about 10 percent of which are larger than 0.75 inch in diameter; medium acid; clear smooth boundary.

BE—5 to 12 inches; yellowish red (5YR 5/6) loamy fine sand; weak medium subangular blocky structure; very friable; common fine and medium and few coarse roots; material filling some of the root channels; about 5 percent small angular, flattened, and slightly rounded fragments of ironstone, about 10 percent of which are larger than 0.75 inch in diameter; strongly acid; clear wavy boundary.

Bt1—12 to 21 inches; red (2.5YR 5/8) fine sandy loam; weak medium subangular blocky structure; friable; few root channels; common distinct clay films on faces of peds; about 10 percent angular, flattened, and slightly rounded fragments of ironstone, about 10 percent of which are larger than 0.75 inch in diameter; strongly acid; clear wavy boundary.

Bt2—21 to 30 inches; red (2.5YR 4/6) gravelly sandy

clay loam; moderate medium and fine subangular blocky structure; firm; few fine roots; common distinct clay films on faces of peds; about 20 percent angular and flattened fragments of ironstone that are 0.25 inch to 8.0 inches thick and 0.5 inch to 3.0 inches long; about 40 percent of angular fragments are larger than 0.75 inch in diameter; thick clay coatings are on the surface of some fragments; strongly acid; clear smooth boundary.

Bt3—30 to 42 inches; red (2.5YR 4/6) gravelly sandy clay loam; moderate medium subangular blocky structure; friable; few fine roots; few distinct clay films on faces of peds; about 30 percent flattened and angular fragments of ironstone that are about 0.25 inch to 4.0 inches thick and 1.0 to 8.0 inches long; some fragments lying end-to-end and appearing as a discontinuous layer; few pockets and common thick coatings of yellowish brown (10YR 5/6) fine sandy loam on fragments; medium acid; clear smooth boundary.

B/C—42 to 65 inches; yellowish red (5YR 5/6) sandy clay loam (Bt) and yellowish brown (10YR 5/6) fine sandy loam (C); weak coarse and medium subangular blocky structure; firm in the Bt part and hard and slightly brittle in the C part; less than 5 percent flattened and angular fragments of ironstone; few fine and medium pockets and horizontal seams of light brownish gray (10YR 6/2) clay; few vertical and horizontal seams and ped coatings of red (2.5YR 4/8) clay; medium acid.

The thickness of the solum ranges from 50 to 80 inches. Typically, scattered fragments of ironstone are throughout the solum and make up 15 to 60 percent, by volume, of at least one subhorizon of the argillic horizon. The fragments of ironstone make up 5 to 35 percent, by volume, of the particle-size control section. The content of coarse fragments decreases with increasing depth in most pedons. The content of clay in the control section averages 18 to 35 percent.

The A horizon has value of 4 or 5 and chroma of 2 or 3. Reaction ranges from very strongly acid to slightly acid. The horizon is 3 to 7 inches thick.

Some pedons have an E horizon. This horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 2 to 4. It is loamy fine sand, fine sandy loam, or the gravelly or very gravelly analogs of those textures. Reaction ranges from very strongly acid to slightly acid. The horizon is 4 to 17 inches thick.

The BE horizon has hue of 2.5YR, 5YR, 7.5YR, or 10YR, value of 4 to 6, and chroma of 3 to 8. It is fine sandy loam, loamy fine sand, or the gravelly or very gravelly analogs of those textures. Reaction ranges from very strongly acid to slightly acid.

The Bt horizon has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 4 to 8. It is fine sandy loam, loam, sandy clay loam, clay loam, or the gravelly or very gravelly analogs of those textures. Fragments of ironstone make up 1 percent to as much as 60 percent of the volume of individual subhorizons. In some pedons this horizon has one or more discontinuous to nearly continuous layers of fractured ironstone. These layers are 0.25 inch to 8.0 inches thick. The lateral distance between fractures in these layers ranges from 2 to 10 inches and averages 2 to 4 inches. The number of pockets and streaks of grayish or whitish clay and yellowish loamy or sandy material ranges from none to common. Reaction ranges from very strongly acid to medium acid.

The Bt part of the B/C horizon consists of reddish loamy material, and the C part consists of yellowish loamy or sandy material. The Bt part has colors similar to those of the Bt horizon, but it includes hue of 10R. It is fine sandy loam, loam, sandy clay loam, or clay loam. It typically is friable or firm but is slightly brittle in some pedons. The C part has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 4 to 8. It makes up 20 to 40 percent of the horizon. It is loamy fine sand, loamy sand, fine sandy loam, or sandy loam. It typically is slightly hard or hard and slightly brittle or brittle, but it is friable to loose in some pedons. The number of small to large pockets, streaks, and strata of grayish or whitish clay is few or common. Fragments of ironstone make up less than 1 percent to as much as 5 percent of the horizon. Reaction ranges from very strongly acid to medium acid.

Some pedons have a B/C2 horizon. This horizon is similar in color and texture to the B/C horizon, except that the C part contains 30 to 50 percent, by volume, weakly cemented sandstone. The C part is hard and brittle but can be easily cut with a spade. It occurs as small to large pockets and as strata. Few or common fine and medium roots are concentrated in the Bt part. The Bt part occurs mainly as narrow to wide, vertically oriented clay flows. Thin or thick clay films are on the faces of some peds in the Bt part. The number of small to large pockets and streaks of grayish or whitish clay is few or common. Reaction ranges from very strongly acid to medium acid.

Darley Series

The Darley series consists of well drained, moderately slowly permeable soils on uplands. These soils formed in iron-rich, loamy and clayey sediments

that have a high content of siderite. Slopes range from 1 to 30 percent.

Soils of the Darley series are clayey, kaolinitic, thermic Typic Hapludults.

Darley soils are near Darbonne, Mahan, and Sacul soils. Darbonne and Mahan soils are in landscape positions similar to those of the Darley soils. Darbonne soils are fine-loamy. Mahan and Sacul soils do not have ironstone layers in the subsoil. Sacul soils are at the lower elevations and on the broader ridgetops.

Typical pedon of Darley gravelly fine sandy loam, 1 to 5 percent slopes; 1 mile north of Vienna, 2,500 feet north and 2,900 feet east of the southwest corner of sec. 26, T. 19 N., R. 3 W.

A—0 to 6 inches; dark brown (7.5YR 4/4) gravelly fine sandy loam; weak fine granular structure; very friable; common fine and common medium roots; about 20 percent angular fragments of ironstone ranging from 0.1 inch to 2.0 inches in diameter, about 50 percent of which are larger than 0.75 inch (do not pass a 0.75-inch sieve); strongly acid; clear smooth boundary.

E—6 to 11 inches; yellowish red (5YR 5/6) gravelly fine sandy loam; weak medium subangular blocky structure; very friable; few coarse and medium and many fine roots; common fine pores; about 16 percent angular fragments of ironstone ranging from about 0.1 inch to 2.0 inches in diameter, about 50 percent of which are larger than 0.75 inch (do not pass a 0.75-inch sieve); strongly acid; clear wavy boundary.

Bt1—11 to 18 inches; yellowish red (5YR 4/6) sandy clay; strong coarse prismatic structure parting to moderate medium subangular blocky; friable; common fine and medium roots; about 5 percent angular fragments of ironstone ranging from 0.1 to 1.0 inch in diameter; few prominent clay films on faces of peds; medium acid; clear wavy boundary.

Bt2—18 to 29 inches; red (2.5YR 4/6) sandy clay; moderate coarse prismatic structure parting to moderate coarse subangular blocky; friable; few fine and medium roots; few fine pores; many distinct clay films on faces of peds; common pockets of strong brown (7.5YR 5/6) sandy loam 0.25 to 1.0 inch in diameter; few small angular fragments of ironstone; medium acid; abrupt smooth boundary.

Bt/Bsm—29 to 53 inches; alternating layers of red (2.5YR 4/8) clay (Bt) and nearly continuous ledges of fractured ironstone (Bsm); moderate medium subangular blocky structure (Bt); friable (Bt); two ironstone layers (Bsm) separated by layers of clay that are 0.5 inch to 6.0 inches thick; 4 to 10 inches of lateral distance between fractures; common distinct clay films on faces of peds; common small pockets of gray (10YR 6/1) clay (kaolin) embedded within the Bt material; very strongly acid; abrupt smooth boundary.

BC—53 to 85 inches; yellowish red (5YR 4/8) sandy clay loam; weak medium subangular blocky structure; very friable; few faint clay films on faces of some peds; few weakly cemented, hard and brittle peds; pockets of brownish yellow (10YR 6/6) sandy clay loam; yellowish red (5YR 4/6) coatings on faces of some peds; thin rind of dark red (10R 3/6) material surrounding common pockets of light gray (10YR 7/1) clay; very strongly acid.

The solum is more than 60 inches thick. The depth to ironstone layers typically is 20 to 40 inches but ranges from 10 to 40 inches. Angular and flattened fragments of ironstone make up 15 to 35 percent of the volume in the A and E horizons. The number of fractured, nearly continuous ironstone layers within the solum typically ranges from 1 to 4. The thickness of the ironstone layers ranges from 0.5 inch to 12.0 inches. The lateral distance between fractures in the ironstone ranges from 2 to 20 inches and averages 4 to 8 inches. The average content of clay in the textural control section ranges from 40 to 60 percent. In at least one subhorizon within a depth of 30 inches, exchangeable aluminum makes up 50 percent or more of the effective cation-exchange capacity.

The A horizon has hue of 5YR, 7.5YR, or 10YR, value of 4 or 5, and chroma of 3 to 8. Reaction ranges from very strongly acid to medium acid. The horizon is 3 to 8 inches thick.

The E horizon has hue of 5YR or 7.5YR, value of 5 or 6, and chroma of 3 to 8. It is gravelly loamy fine sand, gravelly loamy sand, gravelly fine sandy loam, or gravelly sandy loam. Reaction ranges from very strongly acid to medium acid.

The part of the Bt horizon above the ironstone layers has value of 3 to 5 and chroma of 3 to 8. It is sandy clay loam, clay loam, sandy clay, clay, or the gravelly analogs of those textures. The content of clay ranges from 35 to 60 percent. Fragments of ironstone make up less than 1 percent to 20 percent of the volume. Reaction ranges from very strongly acid to medium acid.

The Bt/Bsm horizon consists of alternating layers of ironstone and sandy clay, clay, or the gravelly analogs of those textures. Fragments of ironstone, including fragments of the ironstone layers, make up 20 to 60 percent of the horizon. The ironstone layers are fractured and range from 0.5 inch to 12.0 inches in thickness. The lateral distance between fractures ranges from 2 to 20 inches and averages 4 to 8 inches.

The ironstone layers typically are continuous for several feet, but in some pedons they are intermittent and extend only a few feet horizontally. In some pedons the layers are parts of large spheroidal configurations that are separated from one another by vertical flows of red clay, sandy clay, or clay loam. The fraction of the horizon that is less than 0.1 inch in diameter has hue of 5YR, 2.5YR, or 7.5YR, value of 3 to 5, and chroma of 4 to 8. Most pedons have few to many small pockets and strata of whitish or grayish kaolin. The number of pockets and strata of loamy or sandy material ranges from none to common. Reaction is very strongly acid or strongly acid.

The BC horizon has hue of 2.5YR, 5YR, 7.5YR, or 10YR, value of 4 to 6, and chroma of 4 to 8. It is fine sandy loam, sandy loam, or sandy clay loam. The number of firm and brittle peds ranges from none to common. These peds make up as much as 20 percent of the matrix. Reaction is very strongly acid or strongly acid.

Dela Series

The Dela series consists of moderately well drained, moderately rapidly permeable soils that formed in loamy alluvium. These soils are on flood plains. Slopes range from 0 to 2 percent.

Soils of the Dela series are coarse-loamy, siliceous, nonacid, thermic Typic Udifluvents.

Dela soils are near Cahaba, Guyton, Iuka, and Ouachita soils. Cahaba, Guyton, and Ouachita have a distinct subsoil. Cahaba soils are on stream terraces or on remnants of stream terraces that appear as islands on the flood plains. Cahaba soils have a distinctly developed, reddish subsoil. Guyton soils are lower on the landscape than the Dela soils. They are grayish throughout. Iuka soils are slightly lower on the flood plains than the Dela soils. They have grayish mottles within a depth of 20 inches. Ouachita soils are in landscape positions similar to those of Dela soils. Ouachita and Guyton soils are fine-silty.

Typical pedon of Dela fine sandy loam, in an area of Iuka-Dela association, frequently flooded; 0.9 mile east of Vienna, 2,600 feet north and 1,830 feet east of the southwest corner of sec. 36, T. 19 N., R. 3 W.

Ap—0 to 4 inches; brown (10YR 5/3) fine sandy loam; weak fine granular structure; very friable; many fine and common medium roots; medium acid; clear smooth boundary.

A—4 to 11 inches; dark brown (10YR 4/3) fine sandy loam; weak medium subangular blocky structure; very friable; common fine and few medium roots; common medium tubular pores; strongly acid; clear smooth boundary.

C1—11 to 23 inches; dark brown (7.5YR 4/4) fine sandy loam; few fine distinct light yellowish brown (10YR 6/4) mottles; massive; very friable; thin strata of brown (10YR 4/3) silt loam; common fine and medium roots; common medium tubular pores; few strong brown (7.5YR 5/6) oxidation stains in root channels and pores; strongly acid; clear wavy boundary.

C2—23 to 36 inches; brown (7.5YR 5/4) fine sandy loam; common fine distinct light yellowish brown (10YR 6/4) mottles; massive; friable; thin strata of pale brown (10YR 6/3) fine sandy loam; few medium roots; common medium pores; strongly acid; gradual wavy boundary.

C3—36 to 47 inches; brown (7.5YR 5/4) fine sandy loam; common medium distinct light yellowish brown (10YR 6/4) mottles; massive; friable; few medium roots; few medium pores; medium acid; clear smooth boundary.

C4—47 to 78 inches; strong brown (7.5YR 5/6) fine sandy loam; common medium prominent light yellowish brown (10YR 6/4) and few fine prominent light brownish gray (10YR 6/2) mottles; massive; very friable; few medium roots; medium acid.

The thickness of the solum ranges from 4 to 20 inches and is the same as the combined thickness of the Ap and A horizons. In at least one subhorizon within a depth of 30 inches, exchangeable aluminum makes up 20 to 50 percent of the effective cation-exchange capacity.

The Ap and A horizons have chroma of 2 or 3. Reaction ranges from strongly acid to slightly acid.

The C horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 6. The number of mottles in shades of brown and yellow ranges from none to many. In some pedons gray mottles are below a depth of 20 inches. Strata within the C horizon range from loamy sand to silty clay loam. The average texture of the 10- to 40-inch control section is sandy loam, fine sandy loam, or loam. Reaction ranges from strongly acid to slightly acid.

Dubach Series

The Dubach series consists of well drained and moderately well drained soils that formed in loamy sediments of late Pleistocene age. These soils are on stream terraces. Permeability is moderate in the upper part of the subsoil and moderately slow in the lower part. Slopes range from 1 to 5 percent.

Soils of the Dubach series are fine-loamy, siliceous, thermic Typic Paleudults.

Dubach soils are similar to Bowie soils and are near Cahaba and Gurdon soils. Bowie soils are on uplands.

They have more than 5 percent plinthite in the subsoil. Cahaba soils are in landscape positions similar to those of the Dubach soils. They have a reddish subsoil. Gurdon soils are in the lower areas and are somewhat poorly drained. They are coarse-silty.

Typical pedon of Dubach fine sandy loam, 1 to 5 percent slopes; 3,200 feet north and 400 feet east of the southwest corner of sec. 25, T. 20 N., R. 4 W.

Ap—0 to 4 inches; brown (10YR 4/3) fine sandy loam; weak fine granular structure; very friable; many fine roots; few fine pores; medium acid; abrupt smooth boundary.

E1—4 to 8 inches; yellowish brown (10YR 5/4) fine sandy loam; weak fine subangular blocky structure; very friable; common fine roots; common fine pores; strongly acid; clear smooth boundary.

E2—8 to 12 inches; light yellowish brown (10YR 6/4) fine sandy loam; weak fine subangular blocky structure; very friable; few medium roots; many fine and medium pores; strongly acid; gradual smooth boundary.

Bt1—12 to 24 inches; strong brown (7.5YR 5/6) clay loam; common distinct yellowish red (5YR 5/6) mottles; moderate medium subangular blocky structure; friable; common fine and medium roots; many medium pores; common distinct clay films on faces of peds; strongly acid; gradual wavy boundary.

Bt2—24 to 33 inches; strong brown (7.5YR 5/6) clay loam; weak coarse prismatic structure parting to weak medium subangular blocky; firm; common fine and medium roots; many medium pores; common distinct yellowish red (5YR 4/6) clay films on faces of peds; very strongly acid; gradual wavy boundary.

Bt3—33 to 43 inches; yellowish brown (10YR 5/8) clay loam; few fine prominent red (2.5YR 4/8) mottles; moderate medium subangular blocky structure; firm; few fine and medium roots; few medium pores; common distinct clay films on faces of peds; very strongly acid; gradual wavy boundary.

Btv1—43 to 49 inches; yellowish brown (10YR 5/6) sandy clay loam; common medium prominent yellowish red (5YR 4/6) and common medium distinct light brownish gray (10YR 6/2) mottles; moderate medium subangular blocky structure; firm, slightly brittle; few fine roots; common medium pores; common distinct clay films on faces of peds; about 3 percent nodules of plinthite; few concretions of iron and manganese oxide; few black stains in root channels and pores; very strongly acid; gradual wavy boundary.

Btv2—49 to 60 inches; strong brown (7.5YR 5/6) sandy clay loam; many coarse prominent light brownish gray (10YR 6/2) and common fine prominent red (2.5YR 4/6) mottles; moderate coarse subangular blocky structure; firm, slightly brittle; few fine roots; few fine pores; common distinct clay films on faces of peds; about 3 percent nodules of plinthite; few black stains in abandoned root channels and pores; very strongly acid; clear wavy boundary.

B′t—60 to 70 inches; yellowish brown (10YR 5/6) sandy clay loam; common medium distinct light brownish gray (10YR 6/2) and strong brown (7.5YR 5/6) mottles; moderate coarse subangular blocky structure; firm, slightly brittle; few medium roots; common medium pores; common distinct clay films on faces of peds; very strongly acid.

The solum is more than 60 inches thick.

The Ap horizon has hue of 7.5YR, value of 4 or 5, and chroma of 2 to 4, or it has hue of 10YR, value of 3 to 5, and chroma of 2 to 4. Reaction ranges from very strongly acid to medium acid.

The E horizon has chroma of 3 to 6. It is fine sandy loam or very fine sandy loam. Reaction ranges from very strongly acid to medium acid. Some pedons do not have an E horizon.

The Bt horizon has value of 5 or 6 and chroma of 4 to 8. It is loam, sandy clay loam, or clay loam. Reaction is strongly acid or very strongly acid.

The Btv horizon has value of 5 or 6 chroma of 4 to 8. Mottles are in various shades of brown, red, and gray. The content of nodules of plinthite is less than 5 percent, by volume. The texture is loam, sandy clay loam, or clay loam. Reaction is strongly acid or very strongly acid.

The B′t horizon has hue of 10YR or 2.5Y, value of 5 or 6, chroma of 4 to 8. Mottles are in shades of brown, red, and gray. The texture is sandy clay loam or clay loam. Reaction is strongly acid or very strongly acid.

Gurdon Series

The Gurdon series consists of somewhat poorly drained, moderately permeable soils on stream terraces. These soils formed in loamy sediments of Pleistocene age. Slopes range from 1 to 3 percent.

Soils of the Gurdon series are coarse-silty, siliceous, thermic Aquic Paleudults.

Gurdon soils are near Dubach and Guyton soils. Dubach soils are higher on the landscape than the Gurdon soils and are well drained. They are fine-loamy. Guyton soils are on flood plains along drainageways and are poorly drained. They are gray throughout.

Typical pedon of Gurdon silt loam, 1 to 3 percent slopes; 2 miles east of Dubach, 100 feet north and 1,150 feet east of the southwest corner of sec. 19, T. 20 N., R. 2 W.

A—0 to 4 inches; brown (10YR 5/3) silt loam; weak fine granular structure; very friable; common fine and medium roots; very strongly acid; clear smooth boundary.

E—4 to 9 inches; pale brown (10YR 6/3) silt loam; weak medium subangular blocky structure; friable; common fine and few medium roots; few fine and medium pores; strong brown (7.5YR 5/6) oxidation stains in pores and root channels; very strongly acid; clear wavy boundary.

Bt1—9 to 16 inches; yellowish brown (10YR 5/6) silt loam; common fine distinct brown (10YR 5/3) mottles; weak medium subangular blocky structure; friable; common fine and medium roots; few fine and medium pores; strong brown (7.5YR 5/6) oxidation stains in pores and root channels; few distinct clay films on peds; very strongly acid; clear wavy boundary.

Bt2—16 to 28 inches; yellowish brown (10YR 5/6) silt loam; many coarse prominent gray (10YR 6/1) and common fine distinct strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; friable; few fine and medium roots; common medium pores; common distinct clay films on faces of most peds; few concretions of iron and manganese oxide; very strongly acid; clear wavy boundary.

Bt3—28 to 42 inches; yellowish brown (10YR 5/6) silty clay loam; many medium prominent light brownish gray (10YR 6/2) and few fine distinct strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; firm; common medium roots; common fine pores; common distinct clay films on faces of peds; very strongly acid; clear wavy boundary.

Bt4—42 to 53 inches; yellowish brown (10YR 5/4) silty clay loam; common medium distinct light brownish gray (10YR 6/2) and few medium distinct yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; firm; common medium pores; few faint clay films on faces of peds; few concretions of iron and manganese oxide; very strongly acid; clear wavy boundary.

Bt5—53 to 75 inches; yellowish brown (10YR 5/6) silty clay loam; many coarse prominent gray (10YR 6/1) mottles; weak medium subangular blocky structure; firm; few fine roots; few fine and medium pores; few concretions of iron and manganese oxide; few faint clay films on faces of peds; very strongly acid.

The thickness of the solum ranges from 60 to 90 inches. Except where the soils have been limed, reaction ranges from extremely acid to medium acid throughout the profile. In at least one subhorizon within a depth of 30 inches, exchangeable aluminum makes up 50 percent or more of the cation-exchange capacity.

The A horizon has value of 4 or 5 and chroma of 2 or 3. It is 3 to 6 inches thick.

The E horizon has value of 5 or 6 and chroma of 3 or 4. It is silt loam or very fine sandy loam.

The upper part of the Bt horizon has value of 5 or 6 and chroma of 4 to 8. The number of mottles with chroma of 2 or less ranges from few to many. The texture is silt loam or very fine sandy loam. The lower part of the Bt horizon has value of 5 or 6 and chroma of 4 to 6. It has common or many mottles with chroma of 2 or less, or it is mottled in shades of brown or gray. The texture is silt loam or silty clay loam.

Guyton Series

The Guyton series consists of poorly drained, slowly permeable soils that formed in loamy alluvium. These soils are on flood plains along streams. Slopes are 0 to 1 percent.

Soils of the Guyton series are fine-silty, siliceous, thermic Typic Glossaqualfs.

Guyton soils commonly are near Cahaba, Dela, Iuka, and Ouachita soils. Cahaba soils are on stream terraces. They have a reddish subsoil. Dela, Iuka, and Ouachita soils are on flood plains and in the higher landscape positions. Dela and Iuka soils are coarse-loamy. Ouachita soils are well drained. They are brownish throughout.

Typical pedon of Guyton silt loam, in an area of Guyton-Ouachita silt loams, frequently flooded; 2.3 miles east of Choudrant, 3,300 feet north and 3,950 feet east of the southwest corner of sec. 28, T. 18 N., R. 1 W.

A—0 to 7 inches; dark grayish brown (10YR 4/2) silt loam; few fine distinct dark yellowish brown (10YR 4/4) and few fine prominent strong brown (7.5YR 5/6) mottles; weak fine granular structure; friable; few fine and common medium roots; strongly acid; clear smooth boundary.

Eg1—7 to 16 inches; grayish brown (10YR 5/2) silt loam; common medium distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; friable; few fine and common medium roots; few medium pores; few spots of organic stains and concretions of iron and manganese oxide; very strongly acid; clear wavy boundary.

Eg2—16 to 28 inches; light brownish gray (10YR 6/2) silt loam; few medium distinct yellowish brown (10YR 5/6) and few fine prominent strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; friable; few fine and common

medium roots; common medium pores; few spots of organic stains and many concretions of iron and manganese oxide; tongues about 2.5 inches wide extending into the B/E horizon; very strongly acid; clear irregular boundary.

B/E—28 to 45 inches; about 60 percent grayish brown (2.5Y 5/2) silty clay loam (Bt) and about 40 percent gray (10YR 6/1) silt loam (E); E material occurring mainly as wide, vertical seams; weak medium and coarse subangular blocky structure; firm in the Bt part and friable in the E part; few fine roots; few fine pores; few faint clay films on faces of some peds; few concretions of iron and manganese oxide; very strongly acid; clear wavy boundary.

Btg1—45 to 59 inches; gray (10YR 6/1) silty clay loam; common medium prominent strong brown (7.5YR 5/6) and few fine faint light gray mottles; weak coarse prismatic structure parting to weak coarse subangular blocky; firm; common distinct clay films on faces of some peds; few slightly brittle peds; few dark grayish brown (10YR 4/2) coatings on faces of some peds; very strongly acid; clear smooth boundary.

Btg2—59 to 85 inches; gray (10YR 5/1) silty clay loam; common fine prominent strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; firm; common distinct clay films on faces of some peds; very strongly acid.

The thickness of the solum ranges from 55 to 80 inches. Reaction ranges from extremely acid to medium acid throughout the profile. In at least one subhorizon within a depth of 30 inches, exchangeable aluminum makes up 50 percent or more of the effective cation-exchange capacity.

The A horizon has value of 4 to 6 and chroma of 2 or 3. It is 2 to 8 inches thick.

The Eg horizon has value of 5 to 8 and chroma of 1 or 2. The number of mottles in shades of brown ranges from few to many. The texture is silt loam, loam, or very fine sandy loam.

The E and Bt parts of the B/E horizon have colors and textures similar to those of the Eg and Bt horizons, respectively. Some pedons have an E/B horizon. In the E/B and B/E horizons, the number of mottles in shades of brown or gray ranges from few to many.

The Btg horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 1 or 2. It is silt loam, silty clay loam, or clay loam. It has few to many mottles in shades of brown or gray.

Iuka Series

The Iuka series consists of moderately well drained, moderately permeable soils that formed in loamy alluvium. These soils are on the flood plains of perennial streams. Slopes are 0 to 1 percent.

Soils of the Iuka series are coarse-loamy, siliceous, acid, thermic Aquic Udifluvents.

Iuka soils are near Cahaba, Dela, Guyton, and Ouachita soils. Cahaba soils are on stream terraces or on remnants of stream terraces that appear as islands on the flood plains. They have a distinct reddish subsoil. Dela soils are slightly higher on the landscape than the Iuka soils. They do not have mottles with chroma of 2 or less within a depth of 20 inches. Guyton soils are in low areas on the flood plains. They are grayish throughout. Ouachita soils are slightly higher on the landscape than the Iuka soils. Guyton and Ouachita soils are fine-silty.

Typical pedon of Iuka fine sandy loam, in an area of Iuka-Dela association, frequently flooded; 3 miles north of Simsboro, 700 feet north and 4,550 feet east of the southwest corner of sec. 33, T. 19 N., R. 4 W.

Ap—0 to 4 inches; dark brown (10YR 4/3) fine sandy loam; weak fine granular structure; friable; many medium and fine roots; medium acid; clear smooth boundary.

A—4 to 11 inches; dark yellowish brown (10YR 4/4) fine sandy loam; common fine faint dark yellowish brown (10YR 3/4) mottles; weak fine subangular blocky structure; friable; common fine and few medium roots; few fine and few medium pores; common dark brown (7.5YR 4/4) organic stains on faces of peds and in root channels; very strongly acid; clear wavy boundary.

C—11 to 30 inches; yellowish brown (10YR 5/4) fine sandy loam; few fine distinct grayish brown (10YR 5/2) and few fine distinct strong brown (7.5YR 5/6) mottles; weak fine subangular blocky structure; friable; few medium and common fine roots; few fine and medium pores; common fine concretions of iron and manganese oxide; very strongly acid; clear wavy boundary.

Cg1—30 to 54 inches; grayish brown (10YR 5/2) loam; common medium distinct dark yellowish brown (10YR 4/4) and few fine prominent strong brown (7.5YR 5/6) mottles; weak fine subangular blocky structure; friable; many fine roots; common fine concretions of iron and manganese oxide; thin strata of brown (10YR 4/3) fine sandy loam; very strongly acid; clear wavy boundary.

Cg2—54 to 75 inches; gray (10YR 5/1) loam; common medium prominent strong brown (7.5YR 5/6) mottles; massive; friable; few fine roots; common fine concretions of iron and manganese oxide; very strongly acid.

The soils are very strongly acid or strongly acid,

except where the surface layer has been limed. Some pedons have thin bedding planes of contrasting textures. In at least one subhorizon within a depth of 30 inches, exchangeable aluminum makes up 20 to 50 percent of the effective cation-exchange capacity.

The Ap and A horizons have hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 or 4, or they have hue of 10YR or 7.5YR, value of 4, and chroma of 2. The A horizon is fine sandy loam, sandy loam, loamy sand, silt loam, or loam.

The C horizon has hue of 7.5YR, 10YR, or 2.5Y, value of 4 to 6, and chroma of 3 to 6. Mottles with chroma of 2 or less are within a depth of 20 inches. The texture is sandy loam, fine sandy loam, loam, or silt loam.

The Cg horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 or 2. The number of brown, red, gray, or yellow mottles ranges from few to many. The texture is sandy loam, fine sandy loam, loam, silt loam, or loamy sand. In some pedons, the horizon has thin strata of sand or it is sandy clay loam or clay loam below a depth of 40 inches. In some pedons a buried A horizon is below a depth of 20 inches.

Mahan Series

The Mahan series consists of well drained, moderately permeable soils that formed in loamy and clayey sediments of Tertiary age. These soils are on uplands. Slopes range from 1 to 12 percent.

Mahan soils are near Bowie, Darbonne, Darley, and Sacul soils. Bowie soils are at the slightly lower elevations and on the broader ridgetops. They have a brownish subsoil. Bowie and Darbonne soils are fine-loamy. Darbonne soils are on ridgetops in landscape positions similar to those of the Mahan soils. They have fragments of ironstone throughout the surface layer and the upper part of the subsoil. Darley soils are in landscape positions similar to those of the Mahan soils and at the lower elevations on the upper side slopes. They have ironstone layers in the subsoil. Sacul soils are on the lower side slopes. They have gray mottles in the upper part of the subsoil.

Typical pedon of Mahan fine sandy loam, 1 to 5 percent slopes; 1.75 miles west of Vienna, 3,350 feet north and 3,675 feet east of the southwest corner of sec. 33, T. 19 N., R. 3 W.

Ap—0 to 7 inches; dark brown (7.5YR 4/4) fine sandy loam; weak fine granular structure; very friable; many fine and medium roots; about 10 percent ironstone gravel; strongly acid; clear smooth boundary.

E—7 to 13 inches; yellowish red (5YR 5/6) fine sandy loam; weak medium subangular blocky structure; very friable; common fine and few medium roots; about 10 percent ironstone gravel; medium acid; clear wavy boundary.

Bt1—13 to 27 inches; red (2.5YR 4/6) sandy clay; strong coarse prismatic structure parting to moderate medium subangular blocky; friable; few fine and medium roots; many distinct clay films on most faces of peds; common fine and medium pores; strongly acid; clear smooth boundary.

Bt2—27 to 39 inches; red (2.5YR 4/6) sandy clay; weak coarse prismatic structure parting to moderate coarse subangular blocky; friable; few fine and medium roots; many distinct clay films on most faces of peds; common fine and medium pores; few pockets of soft strong brown (7.5YR 5/6) material; very strongly acid; clear wavy boundary.

Bt3—39 to 53 inches; red (2.5YR 4/8) sandy clay loam; few coarse prominent strong brown (7.5YR 5/8) mottles; strong medium subangular blocky structure; friable; common distinct clay films on most faces of peds; common fine and medium pores; few fine pockets of gray (10YR 6/1) clay; very strongly acid; clear wavy boundary.

BC—53 to 60 inches; red (2.5YR 4/8) sandy clay loam; common medium prominent gray (10YR 6/1) and few medium prominent strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; friable; many medium pockets of gray (10YR 6/1) clay; very strongly acid; clear wavy boundary.

C—60 to 73 inches; red (2.5YR 4/8), stratified sandy loam and sandy clay loam; massive; friable; many medium pockets of gray (10YR 6/1) clay; very strongly acid.

The thickness of the solum ranges from 40 to more than 60 inches. Gravel-sized fragments of ironstone make up 1 to 10 percent of the volume in the A horizon and 0 to 15 percent of the volume in the Bt, BC, and C horizons. In most pedons the A, Bt, and BC horizons have few coarse fragments of ironstone that are 3 to 20 inches across. The particle-size control section is 35 to 60 percent clay. In at least one subhorizon within a depth of 30 inches, exchangeable aluminum makes up 20 to 50 percent of the effective cation-exchange capacity.

The Ap horizon has hue of 10YR, 7.5YR, or 5YR, value of 3 to 5, and chroma of 2 to 6. Ironstone gravel makes up 0 to 10 percent, by volume, of the horizon. Reaction is strongly acid or medium acid, except where the soils have been limed. The horizon is 3 to 8 inches thick.

The E horizon has hue of 10YR, 7.5YR, or 5YR, value of 4 or 5, and chroma of 4 to 6. It is loamy fine sand, sandy loam, or fine sandy loam. Ironstone gravel

makes up 0 to 10 percent, by volume, of the horizon. Reaction is strongly acid or medium acid.

The Bt horizon has hue of 5YR, 2.5YR, or 10R, value of 4 or 5, and chroma of 6 to 8. It is clay, sandy clay loam, sandy clay, clay loam, or loam. The content of silt is less than 30 percent. In some pedons the horizon has mottles in shades of brown or gray in the lower part. Reaction ranges from very strongly acid to medium acid.

The BC horizon has hue of 5YR, 2.5YR, or 10R, value of 4 or 5, and chroma of 6 to 8. The number of mottles in shades of brown or gray ranges from none to common. The texture is sandy loam, fine sandy loam, clay loam, sandy clay loam, or sandy clay. Reaction ranges from very strongly acid to medium acid.

The C horizon typically is stratified sandy clay loam, sandy loam, or clay loam. The loamy materials are reddish or brownish. The number of small pockets and horizontal seams of whitish clay (kaolin) ranges from none to many. Thin to thick layers of weakly cemented sandstone are in some pedons. Reaction ranges from very strongly acid to medium acid.

McLaurin Series

The McLaurin series consists of well drained, moderately permeable soils that formed in sandy and loamy sediments of Tertiary age. These soils are on uplands. Slopes range from 1 to 3 percent.

Soils of the McLaurin series are coarse-loamy, siliceous, thermic Typic Paleudults.

McLaurin soils are near Betis, Briley, and Trep soils. Betis and Briley soils are at the slightly higher elevations. Betis soils are sandy throughout. Briley and Trep soils have a sandy epipedon that is more than 20 inches thick. Trep soils are at the slightly lower elevations.

Typical pedon of McLaurin loamy fine sand, 1 to 3 percent slopes; 3.3 miles north of Cedarton, 2,900 feet north and 3,900 feet east of the southwest corner of sec. 35, T. 20 N., R. 2 W.

A—0 to 5 inches; dark brown (10YR 3/3) loamy fine sand; weak fine granular structure; very friable; common fine and few medium roots; medium acid; clear smooth boundary.

EB—5 to 14 inches; yellowish brown (10YR 5/4) loamy fine sand; weak fine subangular blocky structure; very friable; common fine and few medium roots; common medium discontinuous random tubular pores; medium acid; clear wavy boundary.

Bt1—14 to 21 inches; red (2.5YR 4/6) loam; moderate medium subangular blocky structure; friable; common fine roots; common fine discontinuous random tubular pores; common prominent clay films on most faces of peds; strongly acid; clear wavy boundary.

Bt2—21 to 30 inches; red (2.5YR 4/6) sandy loam; moderate medium subangular blocky structure; very friable; common fine roots; common fine discontinuous random tubular pores; few distinct clay films on faces of peds; strongly acid; gradual wavy boundary.

Bt3—30 to 43 inches; red (2.5YR 4/8) sandy loam; weak medium subangular blocky structure; very friable; few fine roots; common medium and fine discontinuous random tubular pores; few faint clay films on faces of some peds; strongly acid; gradual wavy boundary.

B/E—43 to 55 inches; about 75 percent yellowish red (5YR 5/6) sandy loam (Bt); weak medium subangular blocky structure; very friable; few fine discontinuous random tubular pores; clay bridges between sand grains; about 25 percent common medium light yellowish brown (10YR 6/4) pockets of uncoated sand grains (E); few faint clay films on faces of some peds; strongly acid; gradual wavy boundary.

B′t—55 to 85 inches; yellowish red (5YR 5/6) sandy clay loam; weak medium subangular blocky structure; friable; sand grains coated and bridged with clay; few faint clay films on faces of some peds; strongly acid.

The solum is 60 or more inches thick. In some pedons fragments and pebbles of ironstone make up 1 to 10 percent, by volume, of the solum.

The A horizon has value of 3 or 4 and chroma of 2 or 3. Reaction ranges from very strongly acid to medium acid. The horizon is 3 to 5 inches thick.

The E horizon, if it occurs, has hue of 10YR, value of 4 or 5, and chroma of 2 to 6, or it has hue of 7.5YR, value of 5, and chroma of 4. It is sandy loam, fine sandy loam, loamy fine sand, or loamy sand. Reaction ranges from very strongly acid to medium acid. The horizon is 2 to 5 inches thick.

The EB horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 8. It is sandy loam, fine sandy loam, loamy sand, or loamy fine sand. Reaction ranges from very strongly acid to medium acid.

Some pedons have a BE horizon. This horizon has colors and textures similar to those of the EB horizon. Reaction is very strongly acid or strongly acid.

The Bt horizon has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 4 to 8. It is loam, sandy loam, or fine sandy loam. Reaction is very strongly acid or strongly acid.

The Bt part of the B/E horizon has colors similar to those of the Bt horizon. The texture is loamy sand,

loamy fine sand, sandy loam, or fine sandy loam. The E part has hue of 7.5YR or 10YR, value of 6 to 8, and chroma of 3 to 8. It makes up 10 to 25 percent, by volume, of the horizon. The E part is sand or fine sand. Reaction is very strongly acid or strongly acid.

The B′t horizon has colors and reaction similar to those of the Bt horizon. It is sandy loam, loam, or sandy clay loam.

Ouachita Series

The Ouachita series consists of well drained, moderately slowly permeable soils that formed in loamy alluvium. These soils are on flood plains. Slopes range from 0 to 2 percent.

Soils of the Ouachita series are fine-silty, siliceous, thermic Fluventic Dystrochrepts.

Ouachita soils are near Cahaba, Dela, Guyton, and Iuka soils. Cahaba soils are on stream terraces. They are fine-loamy. Dela soils are in landscape positions similar to those of the Ouachita soils. They are coarse-loamy. Guyton soils are on the flood plains in landscape positions lower than those of the Ouachita soils and are poorly drained. They are grayish throughout. Iuka soils are slightly lower on the landscape than the Ouachita soils. They have gray mottles within a depth of 20 inches.

Typical pedon of Ouachita silt loam, in an area of Guyton-Ouachita silt loams, frequently flooded; 3 miles southeast of Dubach, 1,400 feet north and 4,500 feet east of the southwest corner of sec. 30, T. 20 N., R. 2 W.

A—0 to 4 inches; brown (10YR 4/3) silt loam; weak fine subangular blocky structure; friable; many fine and few medium roots; very strongly acid; clear smooth boundary.

BE—4 to 11 inches; dark yellowish brown (10YR 4/4) silt loam; weak medium subangular blocky structure; friable; common fine and few medium roots; common fine pores; very strongly acid; clear wavy boundary.

Bw1—11 to 23 inches; yellowish brown (10YR 5/8) silty clay loam; few fine distinct light yellowish brown (10YR 6/4) mottles; weak medium subangular blocky structure; friable; few fine roots; common fine pores; very strongly acid; clear wavy boundary.

Bw2—23 to 40 inches; dark yellowish brown (10YR 4/4) silty clay loam; common fine distinct yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; friable; few fine roots; common fine pores; very strongly acid; clear wavy boundary.

Bw3—40 to 62 inches; yellowish brown (10YR 5/4) silty clay loam; common medium faint pale brown (10YR 6/3) and few fine distinct light brownish gray (10YR 6/2) mottles; weak fine subangular blocky structure; friable; few fine roots; common fine pores; many fine black specks; very strongly acid; abrupt wavy boundary.

C—62 to 80 inches; yellowish brown (10YR 5/8) fine sandy loam; many medium prominent gray (10YR 6/1) and common fine distinct strong brown (7.5YR 5/6) mottles; massive; friable; very strongly acid.

The thickness of the solum ranges from 40 to 80 inches. The soils are very strongly acid or strongly acid throughout, except where the surface layer has been limed. The content of organic matter decreases irregularly with increasing depth. In at least one subhorizon within a depth of 30 inches, exchangeable aluminum makes up 50 percent or more of the effective cation-exchange capacity.

The A horizon has value of 4 and chroma of 2 to 4 or has value of 5 and chroma of 3. The horizon is 2 to 6 inches thick.

The BE horizon has value of 4 or 5 and chroma of 3 or 4. It is silt loam, loam, or very fine sandy loam.

The Bw horizon has value of 4 or 5 and chroma of 3 to 8 or has value of 4 and chroma of 2. The number of brownish mottles ranges from none to many. The number of gray mottles ranges from none to common in the lower part of the horizon. The texture is silt loam, very fine sandy loam, loam, or silty clay loam.

The C horizon has colors similar to those of the Bw horizon. It is silt loam, very fine sandy loam, fine sandy loam, sandy loam, or loamy fine sand.

Sacul Series

The Sacul series consists of moderately well drained, slowly permeable soils on uplands. These soils formed in loamy and clayey sediments of Tertiary age. Slopes range from 1 to 30 percent.

Soils of the Sacul series are clayey, mixed, thermic Aquic Hapludults.

Sacul soils are near Angie, Bowie, Darley, Dubach, and Mahan soils. Angie soils are at the slightly lower elevations. They have a subsoil that is yellowish brown in the upper part. Bowie and Dubach soils have a yellowish brown subsoil. They are fine-loamy. Bowie and Mahan soils are at elevations higher than those of the Sacul soils. Dubach soils are on terraces. Darley soils have nearly continuous ironstone ledges in the lower part of the B horizon. They are at the higher elevations or on the narrower ridgetops. Mahan soils do not have gray mottles in the upper part of the subsoil.

Typical pedon of Sacul very fine sandy loam, 1 to 5 percent slopes; 1.25 miles north of Corinth, 300 feet

north and 1,200 feet east of the southwest corner of sec. 4, T. 20 N., R. 4 W.

A—0 to 4 inches; dark brown (10YR 4/3) very fine sandy loam; weak fine granular structure; very friable; common fine and medium roots; very strongly acid; abrupt smooth boundary.

E—4 to 10 inches; yellowish brown (10YR 5/4) very fine sandy loam; weak thin platy structure parting to weak fine subangular blocky; very friable; common fine and medium roots; common fine and medium pores; strongly acid; clear wavy boundary.

Bt1—10 to 22 inches; yellowish red (5YR 5/6) silty clay; strong coarse prismatic structure parting to moderate medium subangular blocky; friable; common fine and medium roots; common fine and medium pores; common distinct clay films on faces of most peds; very strongly acid; clear wavy boundary.

Bt2—22 to 30 inches; red (2.5YR 4/8) clay; common medium prominent gray (10YR 6/1) and few fine prominent light yellowish brown (10YR 6/4) mottles; weak coarse prismatic structure parting to moderate medium subangular blocky; firm; common fine and medium roots; common distinct clay films on faces of most peds; very strongly acid; clear wavy boundary.

Bt3—30 to 42 inches; red (2.5YR 4/8) clay; many coarse prominent gray (10YR 6/1) mottles; weak medium angular blocky structure; firm; few fine roots; few faint clay films on faces of some peds; very strongly acid; clear wavy boundary.

Btg—42 to 67 inches; gray (10YR 6/1) silty clay loam; many medium prominent red (2.5YR 4/8) mottles; weak medium subangular blocky structure; firm; few faint clay films on faces of some peds; very strongly acid; clear wavy boundary.

BCg—67 to 78 inches; gray (10YR 6/1) silty clay loam; few fine prominent red (2.5YR 4/8) mottles; weak medium angular blocky structure; firm; common abandoned root channels that are coated with yellowish red (5YR 5/6) oxidation stains; extremely acid; clear wavy boundary.

C—78 to 84 inches; mottled yellowish red (5YR 5/6), gray (10YR 6/1), and strong brown (7.5YR 5/6) sandy clay loam; massive; friable; extremely acid.

The thickness of the solum ranges from 40 to 78 inches. The depth to gray mottles ranges from 7 to 24 inches below the top of the Bt horizon. Fragments of ironstone make up 0 to 10 percent, by volume, of the solum. In at least one subhorizon within a depth of 30 inches, exchangeable aluminum makes up 50 percent or more of the effective cation-exchange capacity.

The A horizon has value of 3 or 4 and chroma of 2 or 3. Reaction is very strongly acid or strongly acid. The horizon is 2 to 6 inches thick.

The E horizon has value of 5 or 6 and chroma of 3 or 4. It is very fine sandy loam or fine sandy loam. Reaction is very strongly acid or strongly acid.

The upper part of the Bt horizon has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 6 to 8. The upper 20 inches of the horizon is clay, silty clay, clay loam, or sandy clay and averages about 45 percent clay. Reaction ranges from extremely acid to strongly acid. The lower part of the horizon has the same colors, texture, and reaction as the upper part. It has few to many brown, red, or gray mottles.

The Btg horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 1 or 2. The number of mottles in shades of red or brown ranges from few to many. The texture is silty clay loam, sandy clay loam, clay loam, or sandy clay. Reaction ranges from extremely acid to strongly acid.

The BCg horizon has the same colors as the Btg horizon. It is silty clay loam, sandy clay loam, clay loam, loam, or very fine sandy loam. The number of mottles in shades of red or brown ranges from few to many. Reaction ranges from extremely acid to strongly acid.

The C horizon is mottled in shades of brown, red, and gray. These colors occur about equally or gray or red is dominant. The texture ranges from sandy loam to clay loam. Reaction ranges from extremely acid to strongly acid.

Trep Series

The Trep series consists of moderately well drained, moderately slowly permeable soils that formed in sandy, loamy, and clayey sediments of Tertiary age. These soils are on uplands. Slopes range from 1 to 5 percent.

Soils of the Trep series are loamy, siliceous, thermic Arenic Paleudults.

Trep soils are near Betis, Bowie, Briley, and McLaurin soils. Betis, Briley, and McLaurin soils are at the slightly higher elevations, and Bowie soils are at the lower elevations. The nearby soils do not have a clayey layer in the subsoil.

Typical pedon of Trep loamy fine sand, 1 to 5 percent slopes; 2 miles south of Grambling, 1,900 feet north and 5,200 feet east of the southwest corner of sec. 31, T. 18 N., R. 3 W.

Ap—0 to 7 inches; yellowish brown (10YR 5/4) loamy fine sand; weak fine granular structure; very friable; few fine and medium roots; medium acid; clear smooth boundary.

E—7 to 27 inches; light yellowish brown (10YR 6/4) loamy fine sand; weak fine subangular blocky structure; very friable; few fine and medium roots;

few medium pores; few streaks and pockets of very pale brown (10YR 7/3) material; strongly acid; gradual smooth boundary.

Bt1—27 to 37 inches; yellowish brown (10YR 5/6) sandy clay loam; common medium prominent yellowish red (5YR 5/6) and common medium distinct light yellowish brown (10YR 6/4) mottles; moderate medium subangular blocky structure; friable; common fine and medium pores; common distinct clay films on faces of peds; strongly acid; gradual smooth boundary.

Bt2—37 to 52 inches; yellowish brown (10YR 5/6) sandy clay loam; many coarse prominent red (2.5YR 4/6) and common medium distinct light brownish gray (10YR 6/2) mottles; moderate medium subangular blocky structure; friable; common medium pores; common distinct clay films on faces of peds; very strongly acid; gradual wavy boundary.

Bt3—52 to 72 inches; mottled yellowish brown (10YR 5/6), gray (10YR 6/1), and red (2.5YR 4/8) sandy clay; weak medium subangular blocky structure; firm; few pockets of red (2.5YR 4/8) sandy loam; few faint clay films on faces of peds; strongly acid.

The thickness of the solum ranges from 60 to more than 80 inches. In at least one subhorizon within a depth of 30 inches, exchangeable aluminum makes up 20 to 50 percent of the effective cation-exchange capacity.

The Ap horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2 to 4. The values of the E horizon are 1 or 2 units higher than those of the Ap horizon. The E horizon is loamy fine sand or fine sand. Reaction in the A and E horizons ranges from strongly acid to slightly acid unless the soils are limed.

The upper part of the Bt horizon has hue of 10YR or 2.5Y, value of 5 or 6, chroma of 4 to 8. The number of mottles in shades of red or brown is few or common. Mottles with chroma of 2 or less are below a depth of 30 inches. The texture is sandy clay loam or loam. Reaction ranges from very strongly acid to medium acid.

The lower part of the Bt horizon is typically mottled in shades of gray, brown, or red. In some pedons it has a grayish or brownish matrix with yellow or red mottles. The texture is clay or sandy clay. Reaction is very strongly acid or strongly acid.

Formation of the Soils

In this section, the processes and factors of soil formation are explained and related to the soils in Lincoln Parish and the landforms and surface geology of the parish are described.

Processes of Soil Formation

The processes of soil formation influence the kind and degree of profile development. The factors of soil formation—climate, living organisms, relief, parent material, and time—determine the rate and relative effectiveness of different processes.

Soil-forming processes are those that result in addition of organic, mineral, and gaseous materials to the soil; losses of these materials from the soil; translocation of materials from one point to another within the soil; and physical and chemical transformation of mineral and organic material within the soil *(15)*.

Many processes occur simultaneously. Examples are the accumulation of organic matter, the development of soil structure, and leaching of bases from some soil horizons. The contribution of a particular process can change over a period of time. For example, the construction of dams to form lakes or the installation of drainage and water-control systems can change the length of time that some soils are flooded or saturated with water. Some processes that have contributed to the formation of the soils in Lincoln Parish are described in the following paragraphs.

Organic matter has accumulated in all of the soils, has partly decomposed, and has been incorporated into the soils. Because most organic matter is produced in and above the surface layer, this layer is higher in content of organic matter than the lower horizons. Living organisms decompose, incorporate, and mix organic matter into the soil. Many of the more stable products of decomposition remain as finely divided material that helps to darken the soil and increases the water-holding and cation-exchange capacities and the degree of granulation in the soil.

The addition of alluvial sediments on the surface has contributed to the formation of several soils in the parish by providing new parent material. The soils that formed under these conditions may not have prominent horizons. For example, Dela, Iuka, and Ouachita soils formed in recent flood plain deposits and contain distinct depositional strata at a depth of about 40 inches or less.

Plant roots and living organisms help to rearrange soil material into secondary aggregates. The decomposition products of organic residue and the secretions of organisms help to stabilize structural aggregates. Alternating periods of wetting and drying and shrinking and swelling contribute to the development of structural aggregates, particularly in soils that have appreciable amounts of clay. No soils in Lincoln Parish are clayey throughout, but most have more clay in the subsoil than in the surface layer.

About a third of the soils in the parish are characterized by horizons that have reduced and segregated iron and manganese compounds. Reducing conditions occur in soils that are poorly aerated for long periods of time. Consequently, the relatively soluble, reduced forms of iron and manganese are predominant over the less soluble, oxidized forms. The reduced compounds of these elements result in the gray colors in the Btg and Cg horizons in Guyton and Iuka soils. The more soluble, reduced forms of iron and manganese can be removed from the soils or translocated within the soils by water. Brown mottles in predominantly gray horizons indicate the segregation and local concentration of oxidized iron compounds in the soil. The well drained and somewhat excessively drained soils do not have the gray color associated with wetness and poor aeration because they are not subject to the reduction and segregation of iron and manganese compounds.

The loss of elements from the soil is another process in soil formation. Water moving through the soils has leached soluble bases and free carbonates from some horizons of soils in the parish. The soils in Lincoln Parish are highly leached, have acid reactions (pH), and have low or medium fertility levels.

The formation, translocation, and accumulation of clay have helped in the formation of most of the soils in

Lincoln Parish. Silicon and aluminum, which are released as a result of weathering of amphiboles and feldspars, can recombine to form secondary clay minerals, such as kaolinite. The weathering of layered silicate minerals, such as biotite, glauconite, and montmorillonite, can also form other clay minerals, such as vermiculite and kaolinite. Accumulations of clay result largely from the translocation of clay from the upper to the lower horizons. As water moves downward, it can carry small amounts of clay in suspension. As the clay is redeposited, it accumulates in the part of the profile where water penetration is deepest or in horizons in which the clay becomes flocculated or is filtered out by fine pores in the soil. Over long periods, these processes can result in distinct horizons of clay accumulation. All of the soils in Lincoln Parish, except for Dela, Iuka, and Ouachita soils, have accumulations of clay in the subsoil.

Secondary accumulations of ironstone are an important process in the formation of some soils in the parish. These accumulations are especially pronounced in Darley, Mahan, and Darbonne soils. The ironstone accumulates as a result of the weathering of minerals, such as siderite, that contain reduced iron. As these minerals are weathered, much of the iron they contain forms iron oxides and thus ironstone layers develop in some of the soils.

Factors of Soil Formation

Soil is a natural, three-dimensional body that forms on the earth's surface. It has properties resulting from the integrated effects of climate and living organisms acting on parent material, as conditioned by relief over periods of time.

The interaction of five main factors influences the processes of soil formation and results in differences among soils. These factors are the physical arrangement and chemical composition of the parent material, the kinds of plants and other organisms living in and on the soil, the relief of the land and its effect on runoff and soil temperature and moisture conditions, and the length of time that has elapsed since soil formation began.

The effect of any one factor can differ from place to place, but the interaction of all the factors determines the kind of soil that forms. As a result, many of the differences in soils cannot be attributed to differences in only one factor. For example, the content of organic matter in the soils of Lincoln Parish is influenced by several factors, including relief, parent material, and living organisms. The following paragraphs describe the factors of soil formation as they relate to soils in the survey area.

Climate

Lincoln Parish is in a region characterized by a humid, subtropical climate. A detailed description of the climate in the parish is given in the section "General Nature of the Parish."

The climate is relatively uniform throughout the parish. Local differences among the soils are not the result of great differences in climate. Warm average temperatures and large amounts of precipitation favor the rapid weathering of readily weatherable minerals in the soils. Ancient climates (paleoclimates) may have differed in the survey area, and some of the differences between soils that formed on old landscapes may have been caused partly by climatic changes during thousands of years. The highly weathered and leached soils in Lincoln Parish mainly resulted from the percolation of large amounts of water downward through the soils over very long periods of time.

On landscapes of comparable ages, differences in weathering, leaching, and translocation of clay are caused chiefly by variations in time, relief, and parent material rather than by variations in climate. The weathering processes that involve the release and reduction of iron are indicated by gray colors in the Bg or Cg horizon in some soils. The oxidation and segregation of iron, resulting from alternating periods of oxidation and reduction, are indicated by mottled horizons and concretions of iron and manganese oxide in some soils.

Living Organisms

Living organisms have a major influence on the kind and extent of horizon development. Plant growth and animal activity disturb the soil, modify porosity, and influence soil structure and the accumulation of organic matter. Photosynthesis, the use of energy from the sun to synthesize the compounds necessary for plant growth, produces additional organic matter. The growth of plants and the eventual decomposition of plants recycle nutrients in the soil. The decomposition of plants is a major source of organic residue. The incorporation of this organic matter into the soil by micro-organisms enhances the development of soil structure and generally increases the infiltration rate and available water capacity in the soil.

Relatively stable organic compounds in soil generally have a very high cation-exchange capacity and thus improve the ability of the soil to absorb and store nutrients. The extent of these and other processes and the kind of organic matter produced can vary widely, depending on the kinds of organisms living in and on the soils. For example, the content of organic matter typically is higher in soils that formed under prairie

vegetation than in soils that formed under forests *(8, 20)*.

Vegetation throughout the survey area originally was forest. The uplands were covered mostly by pine forest. The soils that formed in recent deposits on stream flood plains and in deposits on stream terraces were covered mostly by mixed hardwoods and pines or by hardwood forest.

The accumulation of organic matter depends on the kind and abundance of micro-organisms in the soil. Aerobic organisms use oxygen from the air. They can rapidly breakdown organic residue. These organisms are the major decomposers of organic residue in soils. They are predominant in the better drained and aerated soils.

In the more poorly drained soils, anaerobic organisms are predominant for long periods during the year. These organisms do not require oxygen. They decompose organic residue very slowly. Differences in decomposition by micro-organisms can result in larger amounts of organic matter in soils that have restricted drainage and smaller amounts in better drained soils. Generally, the content of organic matter is higher in areas where the soil is more poorly drained and not well aerated.

Relief

Relief and other physiographic features influence soil formation by affecting drainage, runoff, erosion, deposition, and exposure to the sun and wind. Lincoln Parish is on highly dissected uplands, on flood plains along small streams, and on terraces. Local relief is about 200 feet, and slopes range from nearly level to steep. The influence of relief on soils in the parish is especially evident in the rate of runoff, in internal drainage, and in depth and duration of the seasonal high water table in some of the soils.

Parent Material and Time

The parent material of mineral soils is the material in which the soils first formed. In Lincoln Parish, the effects of parent material are particularly evidenced by differences in soil color, texture, permeability, and depth and degree of leaching. Parent material also has a major influence on soil mineralogy and significantly affects the susceptibility of soils to erosion. The characteristics, distribution, and depositional sequence of the parent material in the survey area are described in the section "Landforms and Surface Geology."

Parent material and time are independent factors of soil formation. The parent material is exposed to the processes of soil formation for periods ranging from less than a few years to more than a million years. The length of time influences the kinds of soil horizons and their degree of development. Long periods are generally required for the formation of prominent horizons. Possible differences in the length of time that the processes of soil formation have been active amount to thousands of years for some of the soils in Lincoln Parish.

The soils in the parish formed in parent material deposited during at least three different geologic periods. Dela, Iuka, and Ouachita soils, the youngest soils in the parish, formed in recent alluvial deposits. This alluvium consists of sediments that were eroded from the surrounding, highly weathered uplands.

Cahaba, Dubach, and Gurdon soils are on terraces adjacent and generally parallel to streams that drain the uplands. These soils formed in old alluvium of late Pleistocene age or early Holocene age. This alluvium consists of sediments that were eroded from the surrounding uplands. Cahaba and Dubach soils formed in the sandiest sediments. They are at the highest elevations on stream terraces. They are loamy throughout and have a well developed argillic horizon. Gurdon soils formed in silty deposits that have a low content of sand. They are at intermediate or low elevations on stream terraces. They have a well developed B horizon that is more clayey than the surface horizon.

The parent material of the upland soils in Lincoln Parish consists of sediments deposited during the Tertiary period. These sediments were deposited about 40 to 60 million years ago. They have not been continuously exposed to weathering or the processes of soil formation since the time of deposition. In some places they may have been continuously exposed for periods of more than a million years. The soils that formed in the Tertiary deposits are highly weathered and leached, and they have an acid reaction and low base status throughout. Most of these soils are Ultisols; a few are highly weathered Alfisols. All of these soils have a well developed B horizon that is more clayey than the A horizon. Fertility is low or medium.

Major differences among the soils that formed in the Tertiary deposits are associated with differences in the texture and composition of the parent material. Angie, Darley, Mahan, and Sacul soils formed in clayey deposits or stratified clayey and loamy deposits. These soils have a B horizon that is more than 35 percent clay in the upper part. The soils that formed in loamy or sandy deposits make up a large part of the uplands. They have a B horizon that is less than 35 percent clay.

Several soils formed in Tertiary parent material that contains large amounts of siderite, an iron-carbonate mineral *(7)*. Weathering of the siderite resulted in large accumulations of iron oxide. In many areas these accumulations form continuous ironstone layers.

Although some ironstone commonly occurs in many of the upland soils, the most pronounced accumulations occur in Darley, Mahan, and Darbonne soils.

Landforms and Surface Geology

The three major physiographic units in the parish are uplands, flood plains, and stream terraces. The uplands make up about 84 percent of the land area in the parish. They are hilly and well dissected. The flood plains make up about 12 percent of the land area in the parish. They are level and nearly level. The stream terraces make up about 4 percent of the land area in the parish. They are very gently sloping and gently sloping.

Uplands

The upland soils in Lincoln Parish formed entirely in sediments of Tertiary age. These soils make up part of the D'Arbonne structural platform. Because this platform has only a slight, northeasterly regional dip, outcrops of the Tertiary formation are nearly horizontal beds. The erosion and weathering of this platform have resulted in a dissected plateau that has an overall northeastward regional slope. In this area the valleys have strongly sloping and moderately steep side slopes and a relatively wide, flat bottom. Depending on the extent of dissection, the interfluves range from gently sloping, narrow and convex ridgetops to broad, very gently sloping ridgetops. Local relief is commonly 100 to 250 feet. Some of the highest areas in the State are in Lincoln Parish. Elevations are highest in the southwestern part of the parish and generally decrease to the north and east. Interfluve elevations are greatest, about 325 to 395 feet, in the northwestern part of the parish and decrease to about 225 to 250 feet in the northeastern part *(7)*.

Sediments from two formations of the Claiborne Group were deposited during the Eocene epoch of the Tertiary period *(14)*. Outcrops of these formations make up the entire upland area.

The Cook Mountain Formation is the oldest formation that outcrops in Lincoln Parish. It is bedded marine sediments consisting mostly of greenish gray sideritic and glauconitic clays in the upper part and yellowish to brownish clays and fossiliferous marl in the lower part. The major outcrop area occupies most of the uplands in the western part of the parish *(14)*. Only small areas of the overlying Cockfield Formation remain on some of the highest interfluves. In the eastern part of the parish, outcrops of the Cook Mountain Formation are restricted to the lower slopes, in areas below the younger Cockfield Formation, which is on the upper side slopes and interfluves.

The Cockfield Formation is the youngest of the two Tertiary deposits exposed at the surface in Lincoln Parish. This formation is predominantly nonmarine sediments consisting of bedded brown lignitic clays, silts, and sands in the upper part and sideritic and glauconitic sands to clays in the lower part *(7, 14)*.

The upland soils are related in only a very general way to the particular geologic formation in which they formed. The differences between the soils are associated mostly with differences in the texture and composition of the parent material. Geologic strata that contain large amounts of clay and small amounts of siderite and glauconite are the parent material of Angie and Sacul soils. These strata or similar strata occur in both of the Tertiary formations.

Strata consisting mostly of sideritic and glauconitic clays, silts, or sands are the parent material of Darbonne, Darley, and Mahan soils. These strata occur in the lower Cockfield and upper Cook Mountain Formations. The soils that formed in these strata contain large quantities of ironstone, which accumulated as the siderite and glauconite in the parent material weathered.

Strata containing a large percentage of quartz sands are the parent material of Betis, Briley, and Trep soils. These strata occur in both the Cook Mountain and Cockfield Formations. Bowie and McLaurin soils formed in loamy or moderately sandy strata of the Cook Mountain or Cockfield Formation.

Flood Plains

No major streams flow through Lincoln Parish. The parish is drained almost entirely by streams that originate within its boundaries or in Claiborne Parish to the northwest. Most of Lincoln Parish is drained by streams flowing mainly west to east. Drainage patterns in the southwestern part of the parish generally trend north to south.

Areas of alluvial deposits on flood plains make up about 12 percent of the land area in the parish. Major areas of these deposits correspond to the Guyton-Iuka-Ouachita general soil map unit. Sediments of the flood plains consist of detrital material that was eroded from the surrounding uplands.

The flood plain deposits generally are the youngest deposits in the parish. Many parts of the flood plains receive additional sediments annually from stream overflow. Dela, Iuka, and Ouachita soils formed in these sediments in areas adjacent to the present and former stream channels. These young soils have distinct depositional strata within a depth of 40 inches.

Guyton soils formed mainly in old alluvium. In many areas on the flood plains, however, these soils have a thin overwash of brownish loamy alluvium that was recently deposited by floodwater. Also, in places Guyton

soils are deeply buried under Iuka or Ouachita soils.

The absolute age of the flood plain deposits has not been determined. The soils on recent flood plains, such as Dela, Guyton, Iuka, and Ouachita soils, occur along drainageways throughout the parish. The flood plain deposits are Holocene in age, mostly late Holocene in age, and are probably less than about 5,000 years old.

Stream Terraces

Soils on stream terraces formed mainly in stream sediments of late Pleistocene age. These sediments consist mainly of detrital material that was eroded from the surrounding uplands. The absolute age of the sediments has not been determined but is probably about 10,000 to 30,000 years old. Areas on stream terraces are small. They correspond to the Dubach-Gurdon general soil map unit. Dubach soils are well drained and are on ridges and in other high areas on the terraces. Gurdon soils are somewhat poorly drained and are in low areas. Small areas of Cahaba soils also are on stream terraces. These soils are well drained and are in landscape positions similar to those of Dubach soils. Cahaba soils formed in reddish loamy sediments, and Dubach and Gurdon soils formed in brownish sediments.

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Glossary

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the total cation-exchange capacity.

Bedding planes. Fine stratifications, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediments.

Bottom land. The normal flood plain of a stream, subject to flooding.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Chiseling. Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard, compacted layers to a depth below normal plow depth.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Coarse fragments. If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles (flagstone) 15 to 38 centimeters (6 to 15 inches) long.

Colluvium. Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex, soil. A map unit of two or more kinds of soil in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils are somewhat similar in all areas.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount

of crop residue on the surface throughout the year.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are:

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Dense layer (in tables). A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils

are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic)—Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated)—Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as fire, that exposes the surface.

Excess fines (in tables). Excess silt and clay in the soil. The soil is not a source of gravel or sand for construction purposes.

Fast intake (in tables). The movement of water into the soil is rapid.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.6 centimeters) in diameter.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water (geology). Water filling all the unblocked pores of the material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the "Soil Survey Manual." The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue at the surface of a mineral soil.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an O, A, or E horizon. The B horizon is, in part, a layer of transition from the overlying horizon to the underlying C horizon. The B horizon also has distinctive characteristics, such as accumulation of clay, sesquioxides, humus, or a combination of these; prismatic or blocky structure; redder or browner colors than those in the A horizon; or a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil does not have a B horizon, the A horizon alone is the solum.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Consolidated rock (unweathered bedrock) beneath the soil. The bedrock commonly

underlies a C horizon but can be directly below an A or a B horizon.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are:

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Low strength. The soil is not strong enough to support loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent.* The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium,* from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse,* more than 15 millimeters (about 0.6 inch).

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affects the specified use.

Permeability. The quality of the soil that enables water to move through the profile. Permeability is measured as the number of inches per hour that water moves through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Subsurface tunnels or pipelike cavities are formed by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plinthite. The sesquioxide-rich, humus-poor, highly weathered mixture of clay with quartz and other diluents. It commonly appears as red mottles, usually in platy, polygonal, or reticulate patterns. Plinthite changes irreversibly to an ironstone hardpan or to irregular aggregates on repeated wetting and drying, especially if it is exposed also to heat from the sun. In a moist soil, plinthite can be cut with a spade. It is a form of laterite.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of the acidity or alkalinity of a soil expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Extremely acid	below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Relief. The elevations or inequalities of a land surface, considered collectively.

Rill. A steep-sided channel resulting from accelerated erosion. A rill is generally a few inches deep and not wide enough to be an obstacle to farm machinery.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Seepage (in tables). The movement of water through the soil adversely affects the specified use.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stripcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to wind erosion and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind erosion and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Breaking up a compact subsoil by pulling a special chisel through the soil.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the E horizon. Generally refers to a leached horizon lighter in color and lower in organic matter content than the overlying surface layer.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer" or the "Ap horizon."

Terrace. An embankment, or ridge, constructed on the contour or at a slight angle to the contour across sloping soils. The terrace intercepts surface runoff, so that water soaks into the soil or flows slowly to a prepared outlet.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be

further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). An otherwise suitable soil material that is too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, such as zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Weathering. All physical and chemical changes produced by atmospheric agents in rocks or other deposits at or near the earth's surface. These changes result in disintegration and decomposition of the material.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

(Recorded in the period 1951-79 at Homer Experimental Station, Louisiana)

Month	Temperature						Precipitation				
				2 years in 10 will have--				2 years in 10 will have--			
	Average daily maximum	Average daily minimum	Average	Maximum temperature higher than--	Minimum temperature lower than--	Average number of growing degree days*	Average	Less than--	More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January-----	55.7	34.0	44.9	78	11	89	4.59	2.23	6.63	7	1.0
February----	60.2	36.9	48.6	79	15	115	4.31	2.38	6.01	6	.1
March-------	67.8	43.6	55.7	84	21	237	4.42	2.35	6.24	7	.1
April-------	76.4	52.5	64.5	88	33	435	5.23	2.77	7.38	6	.0
May---------	83.0	59.8	71.4	93	42	663	5.48	2.87	7.76	7	.0
June--------	89.5	66.7	78.1	98	52	843	3.72	.98	5.91	6	.0
July--------	92.6	70.0	81.3	101	59	970	4.73	2.26	6.87	7	.0
August------	92.5	68.7	80.6	101	58	949	3.13	1.61	4.45	5	.0
September---	86.9	63.4	75.2	98	45	756	4.17	1.43	6.42	5	.0
October-----	78.2	51.7	65.0	93	34	465	2.52	.66	4.02	4	.0
November----	66.8	42.5	54.7	84	20	180	4.24	2.42	5.85	6	.0
December----	58.4	36.2	47.3	79	14	77	4.69	2.59	6.53	7	.2
Yearly:											
Average---	75.7	52.2	63.9	---	---	---	---	---	---	---	---
Extreme---	---	---	---	103	9	---	---	---	---	---	---
Total-----	---	---	---	---	---	5,779	51.23	40.30	61.57	73	1.4

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50 degrees F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

(Recorded in the period 1951-79 at Homer Experimental Station, Louisiana)

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	Mar. 23	Mar. 27	Apr. 7
2 years in 10 later than--	Mar. 12	Mar. 21	Apr. 2
5 years in 10 later than--	Feb. 19	Mar. 7	Mar. 22
First freezing temperature in fall:			
1 year in 10 earlier than--	Nov. 13	Nov. 2	Oct. 28
2 years in 10 earlier than--	Nov. 20	Nov. 8	Nov. 1
5 years in 10 earlier than--	Dec. 2	Nov. 18	Nov. 9

TABLE 3.--GROWING SEASON

(Recorded in the period 1951-79 at Homer Experimental Station, Louisiana)

Probability	Daily minimum temperature during growing season		
	Higher than 24 °F	Higher than 28 °F	Higher than 32 °F
	Days	Days	Days
9 years in 10	249	226	212
8 years in 10	261	235	218
5 years in 10	283	254	231
2 years in 10	306	273	244
1 year in 10	320	283	250

TABLE 4.--SUITABILITY AND LIMITATIONS OF MAP UNITS ON THE GENERAL SOIL MAP FOR MAJOR LAND USES

Map unit	Percent of area	Cultivated crops	Pasture	Woodland	Urban uses	
Guyton-Iuka-Ouachita	.12	Poorly suited: flooding, wetness.	Poorly suited: flooding, wetness.	Moderately well suited: flooding, wetness, seedling mortality, equipment use limitation.	Poorly suited:* flooding, wetness.	Po f w
Dubach-Gurdon	4	Moderately well suited: slope, low fertility, wetness, potential aluminum toxicity in root zone.	Well suited.	Dubach: well suited. Gurdon: moderately well suited--wetness, equipment use limitation.	Dubach: moderately well suited--moderate or moderately slow permeability. Gurdon: poorly suited--wetness.	Du w Gu p w
Sacul-Bowie	8	Sacul, 1 to 5 percent slopes: poorly suited--slope. Sacul, 5 to 30 percent slopes: not suited. Bowie, 1 to 5 percent slopes: moderately well suited--slope low fertility, potential aluminum toxicity in root zone. Bowie, 5 to 8 percent slopes: poorly suited--slope.	Sacul, 1 to 12 percent slopes: moderately well suited--slope, low fertility. Sacul, 12 to 30 percent slopes: poorly suited--slope. Bowie, 1 to 5 percent slopes: well suited. Bowie, 5 to 8 percent slopes: moderately well suited--slope, low fertility.	Sacul: moderately well suited--wetness, slope, equipment use limitation. Bowie: well suited.	Sacul: poorly suited--slow permeability, slope, clayey subsoil, wetness, shrink-swell potential, low strength for roads. Bowie: moderately well suited--wetness, moderately slow permeability, slope.	Sa p m s s s p Sa p p s Bo w

See footnote at end of table.

TABLE 4.--SUITABILITY AND LIMITATIONS OF MAP UNITS ON THE GENERAL SOIL MAP FOR MAJOR LAND USES--Conti

Map unit	Percent of area	Cultivated crops	Pasture	Woodland	Urban uses
McLaurin-Betis	3	McLaurin and Betis, 1 to 5 percent slopes: moderately well suited--slope, droughtiness, low fertility, potential aluminum toxicity. Betis, 5 to 12 percent slopes: not suited--slope.	McLaurin: well suited. Betis, 1 to 5 percent slopes: moderately well suited--slope, droughtiness, low fertility. Betis, 5 to 12 percent slopes: poorly suited--slope.	McLaurin: well suited. Betis: moderately well suited--equipment use limitation, seedling mortality.	Moderately well suited: slope, seepage, droughtiness, cutbanks cave.
Darley-Bowie	6	Darley, 1 to 5 percent slopes: moderately well suited--slope, medium fertility, droughtiness, potential aluminum toxicity in root zone. Darley, 5 to 30 percent slopes: not suited--slope. Bowie, 1 to 5 percent slopes: well suited. Bowie, 5 to 8 percent slopes: moderately well suited--slope, low fertility, potential aluminum toxicity in root zone.	Darley, 1 to 12 percent slopes: moderately well suited--slope, medium fertility, droughtiness. Darley, 12 to 30 percent slopes: poorly suited--slope. Bowie, 1 to 5 percent slopes: well suited. Bowie, 5 to 8 percent slopes: moderately well suited--slope, low fertility.	Darley and Bowie, 1 to 12 percent slopes: well suited. Darley, 12 to 30 percent slopes: moderately well suited--erosion hazard.	Darley and Bowie, 1 to 12 percent slopes: moderately well suited--slope, seepage, wetness, moderately slow permeability, ironstone layers, low strength for roads. Darley, 12 to 30 percent slopes: poorly suited--slope.

See footnote at end of table.

TABLE 4.--SUITABILITY AND LIMITATIONS OF MAP UNITS ON THE GENERAL SOIL MAP FOR MAJOR LAND USES--Conti

Map unit	Percent of area	Cultivated crops	Pasture	Woodland	Urban uses
Darley-Mahan	25	Darley and Mahan, 1 to 5 percent slopes: moderately well suited--slope, droughtiness, medium fertility, potential aluminum toxicity in root zone.	Darley, 1 to 12 percent slopes: moderately well suited--slope, medium fertility, droughtiness, stones on surface.	Darley and Mahan, 1 to 12 percent slopes: well suited.	Darley, 1 to 12 percent slopes: moderately well suited--slope, seepage, moderately slow permeability, ironstone layers, low strength for roads.
		Darley and Mahan, 5 to 30 percent slopes: not suited--slope.	Darley, 12 to 30 percent slopes: poorly suited--slope.	Darley, 12 to 30 percent slopes: moderately well suited--erosion hazard.	Darley, 12 to 30 percent slopes: poorly suited--slope.
			Mahan, 1 to 5 percent slopes: well suited.		Mahan, 1 to 5 percent slopes: well suited.
			Mahan, 5 to 12 percent slopes: moderately well suited--slope, medium fertility.		Mahan, 5 to 12 percent slopes: moderately well suited--slope, clayey subsoil, moderate permeability, low strength for roads.

See footnote at end of table.

TABLE 4.--SUITABILITY AND LIMITATIONS OF MAP UNITS ON THE GENERAL SOIL MAP FOR MAJOR LAND USES--Conti

Map unit	Percent of area	Cultivated crops	Pasture	Woodland	Urban uses
McLaurin-Briley-Darley-------	7	McLaurin and Briley: moderately well suited--slope, droughtiness, low or medium fertility, potential aluminum toxicity in root zone. Darley, 1 to 5 percent slopes: moderately well suited--slope, droughtiness, medium fertility, potential aluminum toxicity in root zone. Darley, 5 to 30 percent slopes: not suited--slope.	McLaurin: well suited. Briley: moderately well suited--slope, low fertility, droughtiness. Darley, 1 to 12 percent slopes: moderately well suited--slope, medium fertility, droughtiness, stones on surface. Darley, 12 to 30 percent slopes: poorly suited--slope.	McLaurin: well suited. Briley: moderately well suited--droughtiness, seedling mortality. Darley, 1 to 12 percent slopes: well suited. Darley, 12 to 30 percent slopes: moderately well suited--erosion hazard.	McLaurin and Briley: moderately well suited--seepage, slope, too sandy. Darley, 1 to 12 percent slopes: moderately well suited--slope, seepage, moderately slow permeability, ironstone layers, low strength for roads. Darley, 12 to 30 percent slopes: poorly suited--slope.

See footnote at end of table.

TABLE 4.--SUITABILITY AND LIMITATIONS OF MAP UNITS ON THE GENERAL SOIL MAP FOR MAJOR LAND USES--Conti

Map unit	Percent of area	Cultivated crops	Pasture	Woodland	Urban uses
Sacul-Darley	35	Sacul, 1 to 5 percent slopes: poorly suited--slope. Sacul, 5 to 30 percent slopes: not suited--slope. Darley, 1 to 5 percent slopes: moderately well suited--slope, droughtiness, medium fertility, potential aluminum toxicity in root zone. Darley, 5 to 30 percent slopes: not suited--slope.	Sacul, 1 to 12 percent slopes: moderately well suited--slope, low fertility. Sacul, 12 to 30 percent slopes: poorly suited--slope. Darley, 1 to 12 percent slopes: moderately well suited--slope, medium fertility, droughtiness, stones on surface. Darley, 12 to 30 percent slopes: poorly suited--slope.	Sacul: moderately well suited--wetness, erosion hazard, equipment use limitation. Darley, 1 to 12 percent slopes: well suited. Darley, 12 to 30 percent slopes: moderately well suited--erosion hazard.	Sacul: poorly suited--slow permeability, slope, clayey subsoil, wetness, shrink-swell potential, low strength for roads. Darley, 1 to 12 percent slopes: moderately well suited--slope, seepage, moderately slow permeability, ironstone layers, low strength for roads. Darley, 12 to 30 percent slopes: poorly suited--slope.

* Not suited to dwellings.

TABLE 5.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
AnB	Angie very fine sandy loam, 1 to 3 percent slopes	8,700	2.9
BeC	Betis loamy fine sand, 1 to 5 percent slopes	1,500	0.5
BEE	Betis loamy fine sand, 5 to 12 percent slopes	1,200	0.4
BoC	Bowie fine sandy loam, 1 to 5 percent slopes	11,900	3.9
BoD	Bowie fine sandy loam, 5 to 8 percent slopes	3,400	1.1
BrC	Briley loamy fine sand, 1 to 5 percent slopes	4,300	1.4
ChB	Cahaba fine sandy loam, 1 to 3 percent slopes	1,400	0.5
DbC	Darbonne loamy fine sand, 1 to 5 percent slopes	2,100	0.7
DrC	Darley gravelly fine sandy loam, 1 to 5 percent slopes	29,100	9.6
DRE	Darley gravelly fine sandy loam, 5 to 12 percent slopes	42,500	14.1
DRF	Darley-Sacul association, 12 to 30 percent slopes	32,400	10.7
DuC	Dubach fine sandy loam, 1 to 5 percent slopes	8,500	2.8
GrB	Gurdon silt loam, 1 to 3 percent slopes	2,400	0.8
GyA	Guyton-Ouachita silt loams, frequently flooded	32,300	10.7
IUA	Iuka-Dela association, frequently flooded	26,400	8.7
MhC	Mahan fine sandy loam, 1 to 5 percent slopes	17,000	5.6
MHE	Mahan fine sandy loam, 5 to 12 percent slopes	12,700	4.2
MmB	McLaurin loamy fine sand, 1 to 3 percent slopes	16,800	5.6
ScC	Sacul very fine sandy loam, 1 to 5 percent slopes	12,700	4.2
SCE	Sacul very fine sandy loam, 5 to 12 percent slopes	33,900	11.2
TpC	Trep loamy fine sand, 1 to 5 percent slopes	1,100	0.4
	Total	302,300	100.0

* Less than 0.1 percent.

TABLE 6.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE

(Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Soil name and map symbol	Land capability	Corn	Grain sorghum	Soybeans	Peaches	Bahiagrass	Common bermuda-grass	Improved bermuda-grass
		Bu	Bu	Bu	Bu	AUM*	AUM*	AUM*
AnB------------- Angie	IIe	55	---	28	---	7.5	5.0	12.0
BeC------------- Betis	IIIs	40	---	30	---	6.0	---	8.0
BEE------------- Betis	VIe	---	---	---	---	5.5	---	7.0
BoC------------- Bowie	IIIe	80	---	---	---	9.0	8.0	12.0
BoD------------- Bowie	IVe	70	---	---	---	8.0	7.0	10.0
BrC------------- Briley	IIIe	60	50	---	---	6.0	---	9.0
ChB------------- Cahaba	IIe	85	---	30	---	8.0	7.0	9.5
DbC------------- Darbonne	IIIe	50	---	---	350	7.0	7.0	11.0
DrC------------- Darley	IIIe	50	---	---	350	7.0	7.0	12.0
DRE------------- Darley	VIe	---	---	---	---	5.0	6.5	10.0
DRF------------- Darley-Sacul	VIe	---	---	---	---	---	6.0	---
DuC------------- Dubach	IIIe	95	75	37	350	8.5	7.0	9.5
GrB------------- Gurdon	IIe	---	80	30	---	8.0	7.0	12.0
GyA------------- Guyton-Ouachita	IVw	---	45	20	---	---	5.5	---
IUA------------- Iuka-Dela	IIw	---	50	20	---	7.0	6.5	8.0
MhC------------- Mahan	IIIe	50	---	---	350	7.0	---	8.0
MHE------------- Mahan	VIe	---	---	---	---	6.0	---	7.0
MmB------------- McLaurin	IIe	75	55	25	---	8.0	6.0	10.0
ScC------------- Sacul	IVe	60	70	20	---	7.5	6.5	7.5

See footnote at end of table.

TABLE 6.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Grain sorghum	Soybeans	Peaches	Bahiagrass	Common bermuda-grass	Improved bermuda-grass
		Bu	Bu	Bu	Bu	AUM*	AUM*	AUM*
SCE------------- Sacul	VIe	---	---	---	---	6.5	5.5	7.0
TpC------------- Trep	IIIe	50	60	---	---	6.0	6.0	9.0

* Animal unit month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY

(Absence of an entry indicates that information was not available)

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Productivity class*	Tre
AnB---------------- Angie	9W	Slight	Moderate	Slight	Slight	Severe	Loblolly pine------- Shortleaf pine------ Sweetgum------------ White oak----------- Southern red oak----	86 --- --- --- ---	9 --- --- --- ---	Lobloll
BeC, BEE----------- Betis	7S	Slight	Moderate	Severe	Slight	Slight	Shortleaf pine------ Loblolly pine------- Post oak------------ Sweetgum------------	63 70 --- ---	7 6 --- ---	Lobloll
BoC, BoD----------- Bowie	9A	Slight	Slight	Slight	Slight	Moderate	Loblolly pine------- Shortleaf pine------ Southern red oak---- Sweetgum------------	86 80 --- ---	9 9 --- ---	Lobloll
BrC---------------- Briley	8S	Slight	Slight	Moderate	Slight	Slight	Loblolly pine------- Shortleaf pine------ Post oak------------ Sweetgum------------	80 70 --- ---	8 8 --- ---	Lobloll
ChB---------------- Cahaba	9A	Slight	Slight	Slight	Slight	Moderate	Loblolly pine------- Shortleaf pine------ Yellow-poplar------- Sweetgum------------ Southern red oak---- Water oak-----------	87 70 --- 90 --- ---	9 8 --- 7 --- ---	Loblolll sweetg oak.
DbC---------------- Darbonne	8F	Slight	Slight	Moderate	Moderate	Moderate	Loblolly pine------- Shortleaf pine------ Hickory------------- Southern red oak---- White oak----------- Sweetgum------------	80 75 --- --- --- ---	8 8 --- --- --- ---	Loblolll
DrC, DRE----------- Darley	8F	Slight	Slight	Slight	Moderate	Moderate	Loblolly pine------- Shortleaf pine------ Hickory------------- Southern red oak---- White oak----------- Sweetgum------------	85 75 --- --- --- ---	8 8 --- --- --- ---	Loblolll

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Productivity class*	Tre
DRF**:										
Darley	8R	Moderate	Moderate	Slight	Moderate	Moderate	Loblolly pine	85	8	Lobloll
							Shortleaf pine	75	8	
							Hickory	---	---	
							Southern red oak	---	---	
							White oak	---	---	
							Sweetgum	---	---	
Sacul	8R	Moderate	Moderate	Slight	Moderate	Moderate	Loblolly pine	84	8	Lobloll
							Shortleaf pine	74	8	
							Southern red oak	---	---	
							Sweetgum	---	---	
DuC: Dubach	9A	Slight	Slight	Slight	Slight	Moderate	Loblolly pine	90	9	Lobloll
							Shortleaf pine	---	---	
							Southern red oak	---	---	
							Sweetgum	---	---	
GrB: Gurdon	9W	Slight	Moderate	Slight	Slight	Severe	Loblolly pine	90	9	Lobloll
							Sweetgum	90	7	cherry
							Shortleaf pine	75	8	Shumar
							Shumard oak	---	---	
							Willow oak	---	---	
GyA**:										
Guyton	6W	Slight	Severe	Severe	Severe	Severe	Green ash	100	6	Nuttall
							Sweetgum	---	---	ash.
							Black willow	---	---	
							Nuttall oak	---	---	
							Eastern cottonwood	---	---	
							Sugarberry	---	---	
							Loblolly pine	95	10	
Ouachita	11W	Slight	Moderate	Moderate	Slight	Severe	Loblolly pine	100	11	Cherryb
							Sweetgum	100	10	Nuttal
							Eastern cottonwood	100	9	Shumar
							Cherrybark oak	100	10	
IUA**:										
Iuka	9W	Slight	Moderate	Moderate	Slight	Severe	Loblolly pine	100	9	Lobloll
							Sweetgum	100	10	green
							Eastern cottonwood	105	10	
							Water oak	100	7	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Productivity class*	Tre
IUA**:										
Dela	4W	Slight	Moderate	Moderate	Slight	Severe	Southern red oak	80	4	Lobloll southe
							Sweetgum	90	7	
							Eastern cottonwood	100	9	
							Green ash	---	---	
							Hickory	---	---	
							Loblolly pine	---	---	
MhC, MHE Mahan	9A	Slight	Slight	Slight	Slight	Slight	Loblolly pine	90	9	Lobloll
							Shortleaf pine	---	---	
							Hickory	---	---	
							Southern red oak	---	---	
							Sweetgum	---	---	
							White oak	---	---	
							Post oak	---	---	
MmB McLaurin	8A	Slight	Slight	Slight	Slight	Slight	Loblolly pine	83	8	Lobloll
							Shortleaf pine	70	8	
							Post oak	---	---	
							Hickory	---	---	
ScC, SCE Sacul	8C	Slight	Moderate	Slight	Moderate	Moderate	Loblolly pine	84	8	Lobloll
							Shortleaf pine	74	8	
							Sweetgum	---	---	
							Southern red oak	---	---	
TpC Trep	9S	Slight	Slight	Moderate	Slight	Moderate	Loblolly pine	90	9	Lobloll
							Shortleaf pine	80	9	
							Post oak	---	---	
							Sweetgum	---	---	
							Southern red oak	---	---	

* Productivity class is the yield in cubic meters per hectare per year calculated at the age of culmination of increment for fully stocked natural stands.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 8.--RECREATIONAL DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe")

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
AnB------------------- Angie	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight----------	Slight.
BeC------------------- Betis	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy, slope.	Moderate: too sandy.	Moderate: droughty, too sandy.
BEE------------------- Betis	Moderate: too sandy, slope.	Moderate: too sandy.	Severe: slope.	Moderate: too sandy.	Moderate: droughty, slope, too sandy.
BoC------------------- Bowie	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
BoD------------------- Bowie	Slight----------	Slight----------	Severe: slope.	Slight----------	Slight.
BrC------------------- Briley	Moderate: too sandy.	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.	Moderate: droughty.
ChB------------------- Cahaba	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
DbC------------------- Darbonne	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight----------	Moderate: small stones, droughty.
DrC------------------- Darley	Severe: small stones.	Severe: small stones.	Severe: small stones.	Slight----------	Severe: small stones.
DRE------------------- Darley	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Slight----------	Severe: small stones.
DRF*:					
Darley---------------	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Moderate: slope.	Severe: small stones, slope.
Sacul----------------	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
DuC------------------- Dubach	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
GrB------------------- Gurdon	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
GyA*:					
Guyton---------------	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
GYA*:					
Ouachita	Severe: flooding.	Moderate: flooding, percs slowly.	Severe: flooding.	Moderate: flooding.	Severe: flooding.
IUA*:					
Iuka	Severe: flooding, wetness.	Moderate: flooding, wetness.	Severe: wetness, flooding.	Moderate: wetness, flooding.	Severe: flooding.
Dela	Severe: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.	Severe: flooding.
MhC Mahan	Slight	Slight	Moderate: slope, small stones.	Slight	Slight.
MHE Mahan	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
MmB McLaurin	Slight	Slight	Moderate: slope.	Slight	Moderate: droughty.
ScC Sacul	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, small stones, wetness.	Slight	Slight.
SCE Sacul	Moderate: slope, wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: slope.	Slight	Moderate: slope.
TpC Trep	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy, slope.	Moderate: too sandy.	Slight.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--WILDLIFE HABITAT

(See text for definitions of "good," "fair," "poor," and "very poor")

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
AnB-----------------Angie	Good	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
BeC, BEE-----------Betis	Poor	Fair	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
BoC-----------------Bowie	Good	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
BoD-----------------Bowie	Fair	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
BrC-----------------Briley	Poor	Fair	Good	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
ChB-----------------Cahaba	Good	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
DbC-----------------Darbonne	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
DrC-----------------Darley	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
DRE-----------------Darley	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
DRF*:											
Darley-------------	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Sacul--------------	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
DuC-----------------Dubach	Good	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
GrB-----------------Gurdon	Fair	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
GyA*:											
Guyton-------------	Poor	Fair	Fair	Fair	Fair	Poor	Good	Good	Poor	Fair	Good.
Ouachita-----------	Poor	Fair	Fair	Good	Poor	Fair	Good	Fair	Fair	Good	Fair.
IUA*:											
Iuka---------------	Poor	Fair	Fair	Good	Good	Fair	Poor	Poor	Fair	Good	Poor.
Dela---------------	Poor	Fair	Fair	Good	Good	Good	Poor	Poor	Fair	Good	Poor.
MhC-----------------Mahan	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
MHE-----------------Mahan	Poor	Good	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements								Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba-ceous plants	Hard-wood trees	Conif-erous plants	Shrubs	Wetland plants	Shallow water areas	Open-land wild-life	Wood-land wild-life	Wetland wild-life
MmB----------------- McLaurin	Good	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
ScC----------------- Sacul	Good	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
SCE----------------- Sacul	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
TpC----------------- Trep	Poor	Fair	Good	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--BUILDING SITE DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Shallow excavations	Dwellings without basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
AnB--------------- Angie	Moderate: too clayey, wetness.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Slight.
BeC--------------- Betis	Severe: cutbanks cave.	Slight-----------	Slight-----------	Slight-----------	Moderate: droughty, too sandy.
BEE--------------- Betis	Severe: cutbanks cave.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: droughty, slope, too sandy.
BoC--------------- Bowie	Moderate: wetness.	Slight-----------	Slight-----------	Moderate: low strength.	Slight.
BoD--------------- Bowie	Moderate: wetness.	Slight-----------	Moderate: slope.	Moderate: low strength.	Slight.
BrC--------------- Briley	Severe: cutbanks cave.	Slight-----------	Slight-----------	Slight-----------	Moderate: droughty.
ChB--------------- Cahaba	Severe: cutbanks cave.	Slight-----------	Slight-----------	Slight-----------	Slight.
DbC--------------- Darbonne	Moderate: dense layer.	Slight-----------	Slight-----------	Slight-----------	Moderate: small stones, droughty.
DrC--------------- Darley	Moderate: cemented pan, too clayey.	Slight-----------	Slight-----------	Slight-----------	Severe: small stones.
DRE--------------- Darley	Moderate: cemented pan, too clayey, slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Severe: small stones.
DRF*:					
Darley-----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
Sacul------------	Severe: wetness, slope.	Severe: shrink-swell, slope.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength, slope.	Severe: slope.
DuC--------------- Dubach	Moderate: wetness.	Slight-----------	Slight-----------	Slight-----------	Slight.
GrB--------------- Gurdon	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
GyA*:					
Guyton	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness, flooding.
Ouachita	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.
IUA*:					
Iuka	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.
Dela	Moderate: flooding, wetness.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.
MhC Mahan	Moderate: too clayey.	Slight	Slight	Moderate: low strength.	Slight.
MHE Mahan	Moderate: too clayey, slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope.	Moderate: slope.
MmB McLaurin	Severe: cutbanks cave.	Slight	Slight	Slight	Moderate: droughty.
ScC Sacul	Severe: wetness.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Slight.
SCE Sacul	Severe: wetness.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength.	Moderate: slope.
TpC Trep	Severe: cutbanks cave.	Slight	Slight	Moderate: low strength.	Slight.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--SANITARY FACILITIES

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "good," and other terms. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
AnB----------------- Angie	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack.
BeC----------------- Betis	Severe: poor filter.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: seepage.
BEE----------------- Betis	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Poor: seepage.
BoC, BoD------------ Bowie	Severe: wetness, percs slowly.	Moderate: seepage, slope.	Severe: wetness.	Moderate: wetness.	Fair: too clayey.
BrC----------------- Briley	Slight-----------	Moderate: seepage, slope.	Slight-----------	Severe: seepage.	Good.
ChB----------------- Cahaba	Slight-----------	Severe: seepage.	Severe: seepage.	Slight-----------	Fair: thin layer.
DbC----------------- Darbonne	Severe: percs slowly.	Severe: seepage.	Slight-----------	Slight-----------	Poor: small stones.
DrC----------------- Darley	Severe: cemented pan, percs slowly.	Severe: seepage, cemented pan.	Moderate: cemented pan, too clayey.	Severe: cemented pan.	Poor: cemented pan, small stones.
DRE----------------- Darley	Severe: cemented pan, percs slowly.	Severe: seepage, cemented pan, slope.	Moderate: cemented pan, slope, too clayey.	Severe: cemented pan.	Poor: cemented pan, small stones.
DRF*:					
Darley-------------	Severe: cemented pan, percs slowly, slope.	Severe: seepage, cemented pan, slope.	Severe: slope.	Severe: cemented pan, slope.	Poor: cemented pan, small stones, slope.
Sacul--------------	Severe: wetness, percs slowly, slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
DuC----------------- Dubach	Severe: wetness, percs slowly.	Moderate: seepage, slope.	Moderate: wetness.	Moderate: wetness.	Fair: wetness.
GrB----------------- Gurdon	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
GyA*:					
Guyton	Severe: flooding, wetness, percs slowly.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
Ouachita	Severe: flooding, percs slowly.	Severe: flooding.	Severe: flooding, seepage.	Severe: flooding.	Fair: too clayey.
IUA*:					
Iuka	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Fair: wetness.
Dela	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Fair: wetness.
MhC Mahan	Severe: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey, hard to pack.
MHE Mahan	Severe: percs slowly.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, hard to pack, slope.
MmB McLaurin	Slight	Severe: seepage.	Slight	Severe: seepage.	Good.
ScC Sacul	Severe: wetness, percs slowly.	Moderate: slope.	Severe: too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.
SCE Sacul	Severe: wetness, percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: wetness, slope.	Poor: too clayey, hard to pack.
TpC Trep	Severe: wetness, percs slowly.	Severe: seepage.	Moderate: wetness.	Slight	Fair: too clayey.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--CONSTRUCTION MATERIALS

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
AnB Angie	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
BeC Betis	Good	Improbable: thin layer.	Improbable: too sandy.	Fair: too sandy.
BEE Betis	Good	Improbable: thin layer.	Improbable: too sandy.	Fair: too sandy, slope.
BoC, BoD Bowie	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
BrC Briley	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too sandy.
ChB Cahaba	Good	Probable	Improbable: too sandy.	Fair: too clayey.
DbC Darbonne	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
DrC, DRE Darley	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, area reclaim.
DRF*:				
Darley	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, area reclaim.
Sacul	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
DuC Dubach	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
GrB Gurdon	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
GyA*:				
Guyton	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Ouachita	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
IUA*:				
Iuka	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
Dela	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
MhC, MHE: Mahan	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
MmB: McLaurin	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
ScC, SCE: Sacul	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
TpC: Trep	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too sandy.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--WATER MANAGEMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
AnB: Angie	Slight	Moderate: hard to pack, wetness.	Deep to water	Percs slowly, slope.	Erodes easily, percs slowly.	Erodes easily, percs slowly.
BeC: Betis	Severe: seepage.	Severe: seepage, piping.	Deep to water	Droughty, fast intake, slope.	Favorable	Droughty.
BEE: Betis	Severe: seepage.	Severe: seepage, piping.	Deep to water	Droughty, fast intake, slope.	Slope	Slope, droughty.
BoC, BoD: Bowie	Severe: slow refill.	Moderate: piping, wetness.	Deep to water	Slope, rooting depth.	Favorable	Rooting depth.
BrC: Briley	Moderate: seepage.	Moderate: piping.	Deep to water	Slope, droughty, fast intake.	Soil blowing	Droughty.
ChB: Cahaba	Severe: seepage.	Moderate: thin layer, piping.	Deep to water	Favorable	Favorable	Favorable.
DbC: Darbonne	Moderate: seepage, slope.	Moderate: thin layer, seepage, piping.	Deep to water	Slope, droughty, fast intake.	Large stones, soil blowing.	Erodes easily, droughty.
DrC: Darley	Moderate: seepage, cemented pan, slope.	Moderate: thin layer, hard to pack.	Deep to water	Slope, droughty.	Cemented pan, soil blowing.	Droughty, cemented pan.
DRE: Darley	Severe: slope.	Moderate: thin layer, hard to pack.	Deep to water	Slope, droughty.	Slope, cemented pan, soil blowing.	Slope, droughty, cemented pan.
DRF*:						
Darley	Severe: slope.	Moderate: thin layer, hard to pack.	Deep to water	Slope, droughty.	Slope, cemented pan, soil blowing.	Slope, droughty, cemented pan.
Sacul	Severe: slope.	Moderate: hard to pack, wetness.	Percs slowly, slope.	Slope, wetness.	Slope, wetness, soil blowing.	Slope, percs slowly.
DuC: Dubach	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope	Favorable	Favorable.
GrB: Gurdon	Moderate: seepage.	Severe: piping, wetness.	Favorable	Wetness, erodes easily.	Erodes easily, wetness.	Wetness, erodes easily.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
GyA*:						
Guyton	Moderate: seepage.	Severe: piping, wetness.	Percs slowly, flooding.	Wetness, percs slowly, erodes easily.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
Ouachita	Slight	Severe: piping.	Deep to water	Erodes easily, flooding.	Erodes easily	Erodes easily.
IUA*:						
Iuka	Moderate: seepage.	Severe: piping, wetness.	Flooding	Wetness, flooding.	Wetness	Wetness.
Dela	Severe: seepage.	Severe: piping.	Deep to water	Flooding	Favorable	Favorable.
MhC Mahan	Moderate: seepage, slope.	Severe: hard to pack.	Deep to water	Slope, soil blowing.	Soil blowing	Favorable.
MHE Mahan	Severe: slope.	Severe: hard to pack.	Deep to water	Slope, soil blowing.	Slope, soil blowing.	Slope.
MmB McLaurin	Severe: seepage.	Severe: piping.	Deep to water	Droughty	Favorable	Droughty.
ScC Sacul	Moderate: slope.	Moderate: hard to pack, wetness.	Percs slowly, slope.	Slope, wetness.	Wetness	Percs slowly.
SCE Sacul	Severe: slope.	Moderate: hard to pack, wetness.	Percs slowly, slope.	Slope, wetness.	Slope, wetness.	Slope, percs slowly.
TpC Trep	Severe: seepage.	Slight	Deep to water	Fast intake, slope.	Favorable	Favorable.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--ENGINEERING INDEX PROPERTIES

(The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated)

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
AnB-------------- Angie	0-12	Very fine sandy loam.	ML, CL-ML, CL	A-4	0	95-100	90-100	85-100	60-90	15-38	5-22
	12-70	Silty clay loam, silty clay, clay.	CH, CL	A-7-6	0	95-100	90-100	85-100	75-95	41-55	18-29
BeC-------------- Betis	0-47	Loamy fine sand	SM, SP-SM	A-2	0	100	97-100	90-100	10-35	---	NP
	47-76	Loamy fine sand, fine sandy loam.	SM	A-2, A-4	0	100	97-100	90-100	25-50	---	NP
BEE-------------- Betis	0-23	Loamy fine sand	SM, SP-SM	A-2	0	100	97-100	90-100	10-35	---	NP
	23-62	Loamy fine sand, fine sandy loam.	SM	A-2, A-4	0	100	97-100	90-100	25-50	---	NP
BoC-------------- Bowie	0-13	Fine sandy loam	SM, SC-SM, ML, CL-ML	A-2-4, A-4	0	97-100	94-100	90-100	30-55	<25	NP-6
	13-44	Sandy clay loam, clay loam, fine sandy loam.	SC, CL	A-4, A-6	0	90-100	87-100	80-100	40-72	20-40	8-25
	44-67	Sandy clay loam, clay loam, fine sandy loam.	SC, CL	A-4, A-6, A-2	0	80-100	70-100	65-100	34-77	20-40	8-25
	67-85	Sandy clay loam, clay loam, sandy clay.	CL	A-6, A-7	0	95-100	90-100	75-100	51-80	31-49	14-30
BoD-------------- Bowie	0-8	Fine sandy loam	SM, SC-SM, ML, CL-ML	A-2-4, A-4	0	97-100	94-100	90-100	30-55	<25	NP-6
	8-35	Sandy clay loam, clay loam, fine sandy loam.	SC, CL	A-4, A-6	0	90-100	87-100	80-100	40-72	20-40	8-25
	35-63	Sandy clay loam, clay loam, fine sandy loam.	SC, CL	A-4, A-6, A-2	0	80-100	70-100	65-100	34-77	20-40	8-25
	63-75	Sandy clay loam, clay loam, sandy clay.	CL	A-6, A-7	0	95-100	90-100	75-100	51-80	31-49	14-30
BrC-------------- Briley	0-7	Loamy fine sand	SM	A-2-4, A-4	0	95-100	95-100	80-100	17-45	<25	NP-4
	7-27	Loamy fine sand	SM	A-2-4, A-4	0	97-100	95-100	80-100	17-45	<25	NP-4
	27-85	Fine sandy loam, sandy clay loam, loam.	SC, CL	A-4, A-6	0	95-100	95-100	85-100	36-65	22-39	8-22
ChB-------------- Cahaba	0-15	Fine sandy loam	SM	A-4, A-2-4	0	95-100	95-100	65-90	30-45	---	NP
	15-48	Sandy clay loam, loam, clay loam.	SC, CL	A-4, A-6	0	90-100	80-100	75-90	40-75	22-35	8-15
	48-73	Sand, loamy sand, fine sandy loam.	SM, SP-SM	A-2-4	0	95-100	90-100	60-85	10-35	---	NP

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
DbC-------------- Darbonne	0-12	Loamy fine sand	SM, SC-SM, GM-GC, GM	A-2-4, A-4, A-1-b	0-5	60-95	50-90	40-80	15-40	<20	NP-5
	12-42	Fine sandy loam, gravelly sandy clay loam.	SM, SC, GC, GM	A-1-b, A-2-4, A-4	5-20	40-75	35-65	30-60	20-45	<30	NP-15
	42-65	Fine sandy loam, loam, sandy clay loam.	SC-SM, CL-ML, CL, SC	A-2-4, A-4, A-6	0-2	90-100	85-100	70-85	30-55	16-35	5-20
DrC-------------- Darley	0-11	Gravelly fine sandy loam.	SM, SC-SM, SC, GM	A-1-b, A-2-4, A-4	0-5	55-80	40-70	35-65	20-50	<20	NP-8
	11-29	Sandy clay, gravelly sandy clay, clay.	GC, SC, CL, CH	A-7-6, A-2-7	0-5	65-90	55-85	45-80	30-60	40-60	16-30
	29-53	Clay, gravelly clay, gravelly sandy clay.	GC, SC, CL, CH	A-7-6, A-2-7	3-15	40-70	35-60	30-60	25-55	40-60	16-30
	53-85	Sandy loam, fine sandy loam, gravelly sandy clay loam.	SC-SM, CL-ML, CL, SC	A-2-4, A-4, A-6, A-2-6	0-2	80-95	75-90	70-85	30-55	16-35	5-20
DRE-------------- Darley	0-12	Gravelly fine sandy loam.	SM, SC-SM, SC, GM	A-1-b, A-2-4, A-4	0-5	55-80	40-70	35-65	20-50	<20	NP-8
	12-30	Sandy clay, gravelly sandy clay, clay.	GC, SC, CL, CH	A-7-6, A-2-7	0-5	65-90	55-85	45-80	30-60	40-60	16-30
	30-50	Clay, gravelly clay, gravelly sandy clay.	GC, SC, CL, CH	A-7-6, A-2-7	3-15	40-70	35-60	30-60	25-55	40-60	16-30
	50-65	Sandy loam, fine sandy loam, gravelly sandy clay loam.	SC-SM, CL-ML, CL, SC	A-2-4, A-4, A-6, A-2-6	0-2	80-95	75-90	70-85	30-55	16-35	5-20
DRF*:											
Darley----------	0-12	Gravelly fine sandy loam.	SM, SC-SM, SC, GM	A-1-b, A-2-4, A-4	0-5	55-80	40-70	35-65	20-50	<20	NP-8
	12-24	Sandy clay, gravelly sandy clay, clay.	GC, SC, CL, CH	A-7-6, A-2-7	0-5	65-90	55-85	45-80	30-60	40-60	16-30
	24-50	Clay, gravelly clay, gravelly sandy clay.	GC, SC, CL, CH	A-7-6, A-2-7	3-15	40-70	35-60	30-60	25-55	40-60	16-30
	50-60	Sandy loam, fine sandy loam, gravelly sandy clay loam.	SC-SM, CL-ML, CL, SC	A-2-4, A-4, A-6, A-2-6	0-2	80-95	75-90	70-85	30-55	16-35	5-20

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
DRF*:											
Sacul-----------	0-3	Very fine sandy loam.	SM, SC-SM	A-4, A-2	0	75-100	75-100	45-85	25-50	<25	NP-7
	3-6	Very fine sandy loam, fine sandy loam, loamy fine sand.	SM, ML, SC-SM, CL-ML	A-2, A-4, A-1	0	75-100	75-100	40-95	12-75	<30	NP-10
	6-48	Clay, silty clay, clay loam.	CH, CL, SC	A-7	0	85-100	85-100	70-100	40-95	45-70	20-40
	48-60	Silty clay loam, clay loam, loam.	CL, SC	A-6, A-7, A-4, A-2	0	85-100	85-100	65-100	30-95	25-48	8-25
DuC-------------- Dubach	0-12	Fine sandy loam	SM, ML	A-4	0	100	97-100	91-97	40-62	<30	NP-5
	12-43	Loam, sandy clay loam, clay loam.	CL-ML, CL	A-4, A-6	0	99-100	95-100	80-100	55-70	21-35	5-11
	43-60	Sandy clay loam, clay loam, loam.	ML, CL	A-4, A-6, A-7	0	98-100	96-100	90-100	56-80	29-49	4-15
	60-70	Sandy clay loam, clay loam.	ML, CL	A-4, A-5, A-6, A-7	0	98-100	96-100	90-100	56-80	30-49	4-15
GrB-------------- Gurdon	0-9	Silt loam--------	ML, CL-ML	A-4	0	100	95-100	80-100	50-90	<20	NP-5
	9-16	Silt loam, very fine sandy loam.	ML, CL-ML	A-4	0	100	95-100	80-100	50-90	<20	NP-5
	16-28	Silt loam, very fine sandy loam.	ML, CL-ML	A-4	0	100	95-100	80-100	50-90	<25	3-7
	28-75	Silt loam, silty clay loam.	CL-ML, CL	A-4, A-6	0	100	95-100	80-100	55-95	20-40	5-15
GyA*:											
Guyton----------	0-28	Silt loam--------	ML, CL-ML	A-4	0	100	100	95-100	65-90	<27	NP-7
	28-45	Silt loam, silty clay loam, clay loam.	CL, CL-ML	A-6, A-4	0	100	100	94-100	75-95	22-40	6-18
	45-85	Silt loam, silty clay loam, clay loam.	CL, CL-ML, ML	A-6, A-4	0	100	100	95-100	50-95	<40	NP-18
Ouachita--------	0-4	Silt loam--------	ML, CL-ML, CL	A-4	0	100	100	85-95	55-85	<30	2-10
	4-11	Silt loam, loam, very fine sandy loam.	ML, CL-ML, CL	A-4	0	100	100	85-95	55-85	<30	2-10
	11-62	Silt loam, loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	100	100	85-95	55-90	25-40	5-15
	62-80	Fine sandy loam, silt loam, loamy fine sand.	SM, ML, CL-ML, SC-SM	A-4, A-2	0	100	100	70-95	30-90	15-25	NP-7
IUA*:											
Iuka------------	0-11	Fine sandy loam	SM, SC-SM, ML, CL-ML	A-4, A-2	0	95-100	90-100	70-100	30-60	<20	NP-7
	11-30	Fine sandy loam, loam, sandy loam.	SM, SC-SM, ML, CL-ML	A-4	0	95-100	85-100	65-100	36-75	<30	NP-7
	30-75	Sandy loam, fine sandy loam, loam.	SM, ML	A-2, A-4	0	95-100	90-100	70-100	25-60	<30	NP-7

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
IUA*:											
Dela	0-11	Fine sandy loam	ML, CL, SM, SC	A-4	0	100	98-100	94-100	36-60	<30	NP-10
	11-78	Fine sandy loam, sandy loam, loam.	ML, CL, SM, SC	A-4	0	100	98-100	94-100	36-70	<30	NP-10
MhC Mahan	0-13	Fine sandy loam	SM, SC-SM, ML, SC	A-2-4, A-4	0-1	90-100	85-100	65-80	30-55	<25	NP-8
	13-39	Sandy clay loam, sandy clay, clay.	CL, MH, ML, CH	A-7-6, A-6, A-7-5	0-2	90-100	85-95	80-90	50-85	36-55	12-22
	39-60	Sandy loam, fine sandy loam, sandy clay loam.	SC, SC-SM, CL, CL-ML	A-4, A-6	0-2	90-100	85-95	65-85	35-55	16-35	4-18
	60-73	Stratified sandy clay loam to sandy loam.	SC, SC-SM, CL, CL-ML	A-4, A-6	0-1	90-100	85-95	65-85	35-55	16-30	4-15
MHE Mahan	0-14	Fine sandy loam	SM, SC-SM, ML, SC	A-2-4, A-4	0-1	90-100	85-100	65-80	30-55	<25	NP-8
	14-45	Sandy clay loam, sandy clay, clay.	CL, MH, ML, CH	A-7-6, A-6, A-7-5	0-2	90-100	85-95	80-90	50-85	36-55	12-22
	45-60	Sandy loam, fine sandy loam, sandy clay loam.	SC, SC-SM, CL, CL-ML	A-4, A-6	0-2	90-100	85-95	65-85	35-55	16-35	4-18
	60-75	Stratified sandy clay loam to sandy loam.	SC, SC-SM, CL, CL-ML	A-4, A-6	0-1	90-100	85-95	65-85	35-55	16-30	4-15
MmB McLaurin	0-14	Loamy fine sand	SM	A-2	0	90-100	90-100	50-75	15-30	<20	NP-4
	14-43	Sandy loam, fine sandy loam, loam.	SM, SC, SC-SM	A-4	0	90-100	90-100	85-95	36-45	<30	NP-10
	43-55	Loamy fine sand, loamy sand, sandy loam.	SM	A-2, A-4	0	90-100	90-100	50-85	15-45	<20	NP-4
	55-85	Sandy loam, sandy clay loam, loam.	SC, ML, CL, SM	A-4, A-6	0	90-100	90-100	70-80	36-55	30-40	6-15
ScC Sacul	0-4	Very fine sandy loam.	SC-SM, SC, CL-ML, CL	A-4	0	75-100	75-100	65-95	40-75	<30	4-10
	4-10	Very fine sandy loam, fine sandy loam, loamy fine sand.	SM, ML, SC-SM, CL-ML	A-2, A-4, A-1	0	75-100	75-100	40-95	12-75	<30	NP-10
	10-42	Clay, silty clay, clay loam.	CH, CL, SC	A-7	0	85-100	85-100	70-100	40-95	45-70	20-40
	42-84	Silty clay loam, clay loam, loam.	CL, SC	A-6, A-7, A-4, A-2	0	85-100	85-100	65-100	30-95	25-48	8-25

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
SCE-------------- Sacul	0-2	Very fine sandy loam.	SC-SM, SC, CL-ML, CL	A-4	0	75-100	75-100	65-95	40-75	<30	4-10
	2-12	Very fine sandy loam, fine sandy loam, loamy fine sand.	SM, ML, SC-SM, CL-ML	A-2, A-4, A-1	0	75-100	75-100	40-95	12-75	<30	NP-10
	12-60	Clay, silty clay, clay loam.	CH, CL, SC	A-7	0	85-100	85-100	70-100	40-95	45-70	20-40
	60-75	Silty clay loam, clay loam, loam.	CL, SC	A-6, A-7, A-4, A-2	0	85-100	85-100	65-100	30-95	25-48	8-25
TpC-------------- Trep	0-27	Loamy fine sand	SM	A-2-4	0	100	95-100	90-95	15-30	<25	NP-3
	27-52	Sandy clay loam, loam.	SC, CL	A-6	0	100	95-100	80-90	40-70	25-40	11-20
	52-72	Sandy clay, clay	CL	A-6, A-7	0	100	95-100	85-95	55-75	25-45	11-27

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

(The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Organic matter" apply only to the surface layer)

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
AnB--------------	0-12	4-18	1.35-1.65	0.6-2.0	0.18-0.24	4.5-6.5	Low-----------	0.49	5	.5-3
Angie	12-70	35-60	1.20-1.60	0.06-0.2	0.16-0.22	3.6-6.0	High----------	0.32		
BeC--------------	0-47	2-10	1.20-1.50	6.0-20	0.05-0.09	4.5-6.0	Low-----------	0.17	5	.5-3
Betis	47-76	5-15	1.20-1.50	6.0-20	0.08-0.11	4.5-6.0	Low-----------	0.17		
BEE--------------	0-23	2-10	1.20-1.50	6.0-20	0.05-0.09	4.5-6.0	Low-----------	0.17	5	.5-3
Betis	23-62	5-15	1.20-1.50	6.0-20	0.08-0.11	4.5-6.0	Low-----------	0.17		
BoC--------------	0-13	3-15	1.40-1.69	2.0-6.0	0.10-0.15	3.6-6.5	Low-----------	0.32	5	.5-3
Bowie	13-44	18-35	1.60-1.69	0.6-2.0	0.11-0.18	3.6-5.5	Low-----------	0.32		
	44-67	18-35	1.60-1.80	0.2-0.6	0.11-0.18	3.6-5.5	Low-----------	0.32		
	67-85	25-40	1.65-1.80	0.2-0.6	0.11-0.18	3.6-5.5	Moderate------	0.32		
BoD--------------	0-8	3-15	1.40-1.69	2.0-6.0	0.10-0.15	3.6-6.5	Low-----------	0.32	5	.5-3
Bowie	8-35	18-35	1.60-1.69	0.6-2.0	0.11-0.18	3.6-5.5	Low-----------	0.32		
	35-63	18-35	1.60-1.80	0.2-0.6	0.11-0.18	3.6-5.5	Low-----------	0.32		
	63-75	25-40	1.65-1.80	0.2-0.6	0.11-0.18	3.6-5.5	Moderate------	0.32		
BrC--------------	0-7	5-18	1.50-1.65	6.0-20	0.07-0.11	4.5-6.5	Low-----------	0.20	5	<2
Briley	7-27	5-18	1.50-1.65	6.0-20	0.07-0.11	4.5-6.5	Low-----------	0.20		
	27-85	15-35	1.55-1.69	0.6-2.0	0.13-0.17	4.5-6.0	Low-----------	0.24		
ChB--------------	0-15	7-17	1.35-1.60	2.0-6.0	0.10-0.14	4.5-6.0	Low-----------	0.24	5	.5-4
Cahaba	15-48	18-35	1.35-1.60	0.6-2.0	0.12-0.20	4.5-6.0	Low-----------	0.28		
	48-73	4-20	1.40-1.70	2.0-20	0.05-0.10	4.5-6.0	Low-----------	0.24		
DbC--------------	0-12	2-15	1.25-1.70	6.0-20	0.07-0.11	4.5-6.5	Low-----------	0.15	4	.5-4
Darbonne	12-42	10-30	1.35-1.70	0.6-2.0	0.07-0.15	4.5-6.0	Low-----------	0.20		
	42-65	10-30	1.35-1.70	0.2-0.6	0.07-0.17	4.5-6.0	Low-----------	0.28		
DrC--------------	0-11	5-15	1.35-1.70	2.0-6.0	0.08-0.12	4.5-6.5	Low-----------	0.17	3	.5-4
Darley	11-29	35-60	1.20-1.40	0.6-2.0	0.10-0.20	4.5-6.0	Low-----------	0.24		
	29-53	35-60	1.20-1.40	0.2-0.6	0.10-0.20	4.5-5.5	Low-----------	0.24		
	53-85	15-35	1.35-1.70	0.2-0.6	0.11-0.17	4.5-5.5	Low-----------	0.28		
DRE--------------	0-12	5-15	1.35-1.70	2.0-6.0	0.08-0.12	4.5-6.5	Low-----------	0.17	3	.5-4
Darley	12-30	35-60	1.20-1.40	0.6-2.0	0.10-0.20	4.5-6.0	Low-----------	0.24		
	30-50	35-60	1.20-1.40	0.2-0.6	0.10-0.20	4.5-5.5	Low-----------	0.24		
	50-65	15-35	1.35-1.70	0.2-0.6	0.11-0.17	4.5-5.5	Low-----------	0.28		
DRF*:										
Darley----------	0-12	5-15	1.35-1.70	2.0-6.0	0.08-0.12	4.5-6.5	Low-----------	0.17	3	.5-4
	12-24	35-60	1.20-1.40	0.6-2.0	0.10-0.20	4.5-6.0	Low-----------	0.24		
	24-50	35-60	1.20-1.40	0.2-0.6	0.10-0.20	4.5-5.5	Low-----------	0.24		
	50-60	15-35	1.35-1.70	0.2-0.6	0.11-0.17	4.5-5.5	Low-----------	0.28		
Sacul-----------	0-3	5-20	1.30-1.50	0.6-2.0	0.09-0.12	4.5-6.0	Low-----------	0.28	5	1-3
	3-6	2-25	1.40-1.60	0.6-2.0	0.07-0.17	4.5-6.0	Low-----------	0.28		
	6-48	35-60	1.25-1.40	0.06-0.2	0.15-0.18	3.6-5.5	High----------	0.32		
	48-60	15-40	1.30-1.45	0.2-0.6	0.14-0.18	3.6-5.5	Low-----------	0.28		
DuC--------------	0-12	10-25	1.30-1.60	0.6-2.0	0.10-0.15	4.5-6.0	Low-----------	0.24	5	.5-1
Dubach	12-43	18-33	1.30-1.70	0.6-2.0	0.12-0.20	4.5-5.5	Low-----------	0.28		
	43-60	20-35	1.40-1.60	0.6-2.0	0.12-0.17	4.5-5.5	Low-----------	0.28		
	60-70	20-35	1.45-1.70	0.2-0.6	0.06-0.12	4.5-5.5	Low-----------	0.28		

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
GrB-------------- Gurdon	0-9	5-15	1.25-1.60	0.6-2.0	0.13-0.24	3.6-6.0	Low-----------	0.43	5	1-3
	9-16	5-15	1.25-1.60	0.6-2.0	0.13-0.24	3.6-6.0	Low-----------	0.43		
	16-28	10-18	1.25-1.55	0.6-2.0	0.13-0.24	3.6-6.0	Low-----------	0.43		
	28-75	15-35	1.25-1.60	0.6-2.0	0.13-0.24	3.6-6.0	Low-----------	0.43		
GyA*:										
Guyton----------	0-28	7-25	1.35-1.65	0.6-2.0	0.20-0.23	3.6-6.0	Low-----------	0.43	5	.5-4
	28-45	20-35	1.35-1.70	0.06-0.2	0.15-0.22	3.6-6.0	Low-----------	0.37		
	45-85	20-35	1.35-1.70	0.06-0.2	0.15-0.22	3.6-6.0	Low-----------	0.37		
Ouachita--------	0-4	8-25	1.35-1.60	0.6-2.0	0.15-0.22	4.5-5.5	Low-----------	0.37	5	.5-3
	4-11	8-25	1.35-1.60	0.6-2.0	0.15-0.22	4.5-5.5	Low-----------	0.37		
	11-62	18-35	1.35-1.60	0.2-0.6	0.15-0.22	4.5-5.5	Low-----------	0.32		
	62-80	8-25	1.35-1.65	0.6-6.0	0.07-0.22	4.5-5.5	Low-----------	0.24		
IUA*:										
Iuka------------	0-11	6-15	1.35-1.65	2.0-6.0	0.10-0.15	4.5-6.0	Low-----------	0.24	5	.5-3
	11-30	8-18	1.35-1.65	0.6-2.0	0.10-0.20	4.5-5.5	Low-----------	0.28		
	30-75	5-15	1.35-1.65	0.6-2.0	0.10-0.20	4.5-5.5	Low-----------	0.20		
Dela------------	0-11	5-18	1.30-1.60	2.0-6.0	0.10-0.15	5.1-6.5	Low-----------	0.20	5	.5-1
	11-78	5-18	1.50-1.70	2.0-6.0	0.10-0.20	5.1-6.5	Low-----------	0.32		
MhC-------------- Mahan	0-13	2-15	1.35-1.70	2.0-6.0	0.10-0.15	5.1-6.0	Low-----------	0.28	5	.5-4
	13-39	35-60	1.30-1.70	0.6-2.0	0.12-0.18	4.5-6.0	Low-----------	0.32		
	39-60	10-35	1.35-1.70	0.6-2.0	0.10-0.17	4.5-6.0	Low-----------	0.28		
	60-73	10-35	1.35-1.70	0.2-0.6	0.10-0.17	4.5-6.0	Low-----------	0.28		
MHE-------------- Mahan	0-14	2-15	1.35-1.70	2.0-6.0	0.10-0.15	5.1-6.0	Low-----------	0.28	5	.5-4
	14-45	35-60	1.30-1.70	0.6-2.0	0.12-0.18	4.5-6.0	Low-----------	0.32		
	45-60	10-35	1.35-1.70	0.6-2.0	0.10-0.17	4.5-6.0	Low-----------	0.28		
	60-75	10-35	1.35-1.70	0.2-0.6	0.10-0.17	4.5-6.0	Low-----------	0.28		
MmB-------------- McLaurin	0-14	1-5	1.30-1.70	6.0-20	0.05-0.10	4.5-6.0	Very low------	0.17	5	.5-2
	14-43	10-18	1.40-1.60	0.6-2.0	0.10-0.15	4.5-5.5	Low-----------	0.20		
	43-55	5-15	1.30-1.70	2.0-6.0	0.05-0.10	4.5-5.5	Very low------	0.20		
	55-85	5-27	1.40-1.60	0.6-2.0	0.10-0.15	4.5-5.5	Low-----------	0.20		
ScC-------------- Sacul	0-4	10-25	1.30-1.50	0.6-2.0	0.13-0.17	4.5-5.5	Low-----------	0.32	5	1-3
	4-10	2-25	1.40-1.60	0.6-2.0	0.07-0.17	4.5-5.5	Low-----------	0.28		
	10-42	35-60	1.25-1.40	0.06-0.2	0.15-0.18	3.6-5.5	High----------	0.32		
	42-84	15-40	1.30-1.45	0.2-0.6	0.14-0.18	3.6-5.5	Low-----------	0.28		
SCE-------------- Sacul	0-2	10-25	1.30-1.50	0.6-2.0	0.13-0.17	4.5-5.5	Low-----------	0.32	5	1-3
	2-12	2-25	1.40-1.60	0.6-2.0	0.07-0.17	4.5-5.5	Low-----------	0.28		
	12-60	35-60	1.25-1.40	0.06-0.2	0.15-0.18	3.6-5.5	High----------	0.32		
	60-75	15-40	1.30-1.45	0.2-0.6	0.14-0.18	3.6-5.5	Low-----------	0.28		
TpC-------------- Trep	0-27	4-12	1.45-1.65	6.0-20	0.05-0.11	5.1-6.5	Low-----------	0.17	5	.5-2
	27-52	18-35	1.50-1.70	0.6-2.0	0.11-0.16	4.5-6.0	Low-----------	0.24		
	52-72	35-50	1.60-1.70	0.2-0.6	0.12-0.18	4.5-5.5	Moderate------	0.24		

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--SOIL AND WATER FEATURES

("Flooding" and "water table" and terms such as "frequent," "very brief," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Soil name and map symbol	Hydrologic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
					Ft				
AnB: Angie	D	None	---	---	3.0-5.0	Apparent	Dec-Apr	High	Moderate.
BeC, BEE: Betis	A	None	---	---	>6.0	---	---	Low	Moderate.
BoC, BoD: Bowie	B	None	---	---	3.5-5.0	Perched	Jan-Apr	Moderate	High.
BrC: Briley	B	None	---	---	>6.0	---	---	Moderate	High.
ChB: Cahaba	B	None	---	---	>6.0	---	---	Moderate	Moderate.
DbC: Darbonne	B	None	---	---	>6.0	---	---	Low	Moderate.
DrC, DRE: Darley	C	None	---	---	>6.0	---	---	High	High.
DRF*:									
Darley	C	None	---	---	>6.0	---	---	High	High.
Sacul	C	None	---	---	2.0-4.0	Perched	Dec-Apr	High	High.
DuC: Dubach	B	None	---	---	2.5-4.0	Perched	Dec-Mar	Moderate	Moderate.
GrB: Gurdon	C	None	---	---	1.0-2.0	Apparent	Nov-Apr	High	High.
GyA*:									
Guyton	D	Frequent	Very brief to long.	Jan-Dec	0-1.5	Perched	Dec-May	High	High.
Ouachita	C	Frequent	Very brief to long.	Jan-Dec	>6.0	---	---	Moderate	Moderate.
IUA*:									
Iuka	C	Frequent	Very brief	Dec-Apr	1.0-3.0	Apparent	Dec-Apr	Moderate	High.
Dela	B	Frequent	Very brief	Dec-Apr	3.0-5.0	Apparent	Dec-Apr	Moderate	Moderate.
MhC, MHE: Mahan	C	None	---	---	>6.0	---	---	High	High.
MmB: McLaurin	B	None	---	---	>6.0	---	---	Low	Moderate.
ScC, SCE: Sacul	C	None	---	---	2.0-4.0	Perched	Dec-Apr	High	High.
TpC: Trep	B	None	---	---	3.5-5.0	Perched	Nov-May	High	High.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 17.--FERTILITY TEST DATA FOR SELECTED SOILS

(Analyses by the Soil Fertility Laboratory, Louisiana Agricultural Experiment Station)

Soil name and sample number	Horizon	Depth	Organic matter content	pH 1:1 H_2O	Extractable phosphorus	Exchangeable cations: Ca	Mg	K	Na	Al	H	Total acidity	Cation-exchange capacity (sum)	Cation-exchange capacity (effective)	Base saturation (sum)	Satu[ration]: Sum of cation-exchange capacity: Na
		In	Pct		Ppm	Milliequivalents/100 grams of soil									Pct	Pct
Angie very fine sandy loam:[1] (S90LA-61-1)	A	0-6	1.71	4.6	12	0.6	0.2	0.1	0.0	1.4	0.4	10.4	11.3	2.7	6.0	0.0
	E	6-12	0.56	5.0	11	0.5	0.6	0.3	0.0	1.4	0.2	5.9	7.1	2.8	16.9	0.0
	Bt1	12-25	0.35	4.8	18	0.6	2.4	0.3	0.0	5.6	0.0	14.8	18.1	8.9	18.2	0.0
	Bt2	25-39	0.20	4.8	16	0.3	3.7	0.3	0.1	10.0	0.2	20.7	25.1	14.6	17.5	0.4
	Bt3	39-57	0.44	4.7	15	0.2	4.3	0.2	0.1	10.4	0.2	22.2	27.1	15.5	18.1	0.4
	Btg	57-70	0.12	4.7	13	0.2	3.3	0.2	0.1	8.6	0.4	20.0	23.8	12.8	16.0	0.4
	---	---	---	---	---	---	---	---	---	---	---	---	---	---	15.9[2]	---
Betis loamy fine sand:[1] (S90LA-61-2)	A	0-8	0.91	5.1	19	0.3	0.1	0.0	0.0	0.2	0.2	3.7	4.1	0.8	9.8	0.0
	E	8-22	0.11	5.7	14	0.6	0.2	0.0	0.0	0.2	0.4	2.1	2.9	1.4	27.6	0.0
	Bw	22-47	0.02	5.3	14	0.7	0.2	0.1	0.0	0.2	0.4	1.5	2.5	1.6	40.0	0.0
	E/B	47-76	0.01	5.2	16	0.2	0.2	0.0	0.0	0.2	0.6	2.1	2.5	1.2	16.0	0.0
	---	---	---	---	---	---	---	---	---	---	---	---	---	---	20.0[2]	---
Bowie fine sandy loam:[1] (S89LA-61-3)	Ap	0-7	1.94	4.3	179	0.5	0.2	0.1	0.0	1.0	0.8	9.6	10.4	2.6	7.7	0.0
	E	7-13	0.50	4.5	115	0.4	0.1	0.0	0.0	0.8	1.6	4.4	4.9	2.9	10.2	0.0
	Bt1	13-27	0.22	4.7	10	2.1	0.9	0.1	0.0	3.6	1.0	11.8	14.9	7.7	20.8	0.0
	Bt2	27-44	0.03	4.7	14	2.8	1.8	0.1	0.0	4.4	0.6	13.3	18.0	9.7	26.1	0.0
	Btv	44-55	0.02	4.5	11	1.1	1.9	0.1	0.1	6.0	0.8	14.8	18.0	10.0	17.8	0.6
	B/E	55-67	0.01	4.3	7	0.3	1.6	0.1	0.1	7.8	0.2	17.0	19.1	10.1	11.0	0.5
	B′t	67-85	0.00	4.3	8	0.3	1.3	0.1	0.1	6.6	1.8	14.1	15.9	10.2	11.3	0.6
	---	---	---	---	---	---	---	---	---	---	---	---	---	---	11.3[2]	---
Cahaba fine sandy loam:[1] (S90LA-61-3)	A	0-8	3.01	5.2	57	3.2	0.8	0.2	0.0	0.0	0.4	9.8	14.0	4.6	30.0	0.0
	A/B	8-15	0.31	5.7	66	1.5	0.4	0.1	0.0	0.0	0.2	4.0	6.0	2.2	33.3	0.0
	Bt1	15-24	0.20	5.1	126	3.1	0.8	0.2	0.0	0.6	0.8	6.7	10.8	5.5	38.0	0.0
	Bt2	24-40	0.16	5.4	95	3.1	1.0	0.2	0.0	0.2	0.2	5.1	9.4	4.7	45.7	0.0
	Bt3	40-48	0.13	5.1	82	3.4	1.1	0.3	0.0	0.2	0.4	5.6	10.4	5.4	46.2	0.0
	C1	48-61	0.01	5.4	37	0.8	0.4	0.1	0.0	0.0	0.4	4.7	6.0	1.7	21.7	0.0
	C2	61-73	0.01	5.5	56	1.1	0.5	0.1	0.0	0.0	0.8	5.5	7.2	2.5	23.6	0.0
	---	---	---	---	---	---	---	---	---	---	---	---	---	---	21.0[2]	---

See footnotes at end of table.

TABLE 17.--FERTILITY TEST DATA FOR SELECTED SOILS--Continued

Soil name and sample number	Horizon	Depth	Organic matter content	pH 1:1 H_2O	Extractable phosphorus	Exchangeable cations: Ca	Mg	K	Na	Al	H	Total acidity	Cation-exchange capacity (sum)	Cation-exchange capacity (effective)	Base saturation (sum)	Saturation: Sum of cation-exchange capacity: Na
		In	Pct		Ppm	Milliequivalents/100 grams of soil									Pct	Pct
Darbonne loamy fine sand:[1] (S90LA-61-6)	A	0-5	1.17	5.6	20	1.1	0.3	0.1	0.0	0.0	1.0	7.7	9.2	2.5	16.3	0.0
	BE	5-12	0.71	5.5	26	0.8	0.3	0.1	0.0	0.0	0.8	4.7	5.9	2.0	20.3	0.0
	Bt1	12-21	0.28	5.4	18	0.9	0.3	0.1	0.0	0.0	0.6	3.7	5.0	1.9	26.0	0.0
	Bt2	21-30	0.25	5.4	19	2.4	0.6	0.1	0.0	0.0	1.0	5.4	8.5	4.1	36.5	0.0
	Bt3	30-42	0.15	5.8	21	2.2	0.7	0.1	0.0	0.0	0.4	5.2	8.2	3.4	36.6	0.0
	BC	42-65	0.08	5.9	23	1.8	0.8	0.1	0.0	0.0	0.8	5.9	8.6	3.5	31.4	0.0
	---	---	---	---	---	---	---	---	---	---	---	---	---	---	33.7[2]	---
Darley gravelly fine sandy loam:[1] (S89LA-61-5)	A	0-6	0.97	5.3	9	0.7	0.3	0.1	0.0	0.0	0.6	1.5	2.6	1.7	42.3	0.0
	E	6-11	0.53	5.4	9	0.7	0.3	0.1	0.0	0.0	0.6	3.7	4.8	1.7	22.9	0.0
	Bt1	11-18	0.31	5.8	8	2.1	1.3	0.1	0.0	0.0	0.4	3.0	6.5	3.9	53.8	0.0
	Bt2	18-29	0.25	5.7	9	3.0	3.3	0.2	0.0	0.0	0.4	3.0	9.5	6.9	68.4	0.0
	Bt/Bsm	29-53	0.18	4.9	9	0.6	3.0	0.3	0.1	5.2	0.4	6.7	10.7	9.6	37.4	0.9
	BC	53-85	0.04	4.5	9	0.2	0.3	0.1	0.1	4.0	0.6	7.4	8.1	5.3	8.6	1.2
	---	---	---	---	---	---	---	---	---	---	---	---	---	---	32.1[2]	---
Dela fine sandy loam:[1] (S89LA-61-6)	Ap	0-4	0.66	5.7	92	1.4	0.4	0.1	0.0	0.0	0.6	3.6	5.5	2.5	34.5	0.0
	A	4-11	0.99	5.3	39	1.9	0.4	0.1	0.0	0.2	0.4	5.2	7.6	3.0	31.6	0.0
	C1	11-23	0.85	5.2	11	2.1	0.5	0.1	0.0	0.4	0.6	5.9	8.6	3.7	31.4	0.0
	C2	23-36	0.73	5.3	10	2.8	0.8	0.1	0.0	1.0	0.2	7.4	11.1	4.9	33.3	0.0
	C3	36-47	0.34	5.6	15	1.6	0.4	0.0	0.0	0.0	0.8	3.2	5.2	2.8	38.5	0.0
	C4	47-78	0.03	5.6	16	1.4	0.4	0.0	0.0	0.0	0.6	3.0	4.8	2.4	37.5	0.0
Gurdon silt loam:[1] (S90LA-61-5)	A	0-4	1.78	4.7	23	0.9	0.4	0.1	0.0	1.0	1.2	9.3	10.7	3.6	13.1	0.0
	E	4-9	0.45	4.7	16	0.6	0.4	0.0	0.0	2.0	0.6	5.6	6.6	3.6	15.2	0.0
	Bt1	9-16	0.28	4.5	13	0.4	0.6	0.1	0.1	4.0	1.0	9.2	10.4	6.2	11.5	1.0
	Bt2	16-28	0.29	4.8	16	0.3	0.6	0.1	0.1	4.0	1.2	9.5	10.6	6.3	10.4	0.9
	Bt3	28-42	0.15	4.8	12	0.3	0.7	0.1	0.1	5.0	1.0	10.5	11.7	7.2	10.3	0.9
	Bt4	42-53	0.20	4.9	16	0.3	0.7	0.1	0.2	5.4	1.0	12.1	13.4	7.7	9.7	1.5
	Bt5	53-75	0.21	4.9	15	0.3	0.8	0.1	0.2	6.0	1.0	11.1	12.5	8.4	11.2	1.6
	---	---	---	---	---	---	---	---	---	---	---	---	---	---	10.7[2]	---
Iuka fine sandy loam:[1] (S90LA-16-9)	Ap	0-4	2.11	5.8	33	3.4	0.5	0.1	0.0	0.0	1.4	5.9	9.9	5.4	40.4	0.0
	A	4-11	0.98	4.9	19	2.0	0.4	0.0	0.1	1.2	2.4	5.0	7.5	6.1	33.3	1.3
	C	11-30	0.51	4.8	23	1.3	0.3	0.0	0.1	1.4	1.6	8.1	9.8	4.7	17.3	1.0
	Cg1	30-54	0.44	4.8	23	1.5	0.5	0.0	0.1	1.6	2.4	11.1	13.2	6.1	15.9	0.8
	Cg2	54-75	0.36	4.9	20	1.5	0.6	0.0	0.1	2.8	1.8	11.5	13.7	6.8	16.1	0.7

See footnotes at end of table.

TABLE 17.--FERTILITY TEST DATA FOR SELECTED SOILS--Continued

Soil name and sample number	Horizon	Depth	Organic matter content	pH 1:1 H_2O	Extractable phosphorus	Exchangeable cations: Ca	Exchangeable cations: Mg	Exchangeable cations: K	Exchangeable cations: Na	Exchangeable cations: Al	Exchangeable cations: H	Total acidity	Cation-exchange capacity (sum)	Cation-exchange capacity (effective)	Base saturation (sum)	Saturation: Sum of cation-exchange capacity: Na
		In	Pct		Ppm	Milliequivalents/100 grams of soil									Pct	Pct
Mahan fine sandy loam:[1] (S89LA-61-4)	Ap	0-7	1.38	5.3	24	1.7	0.2	0.2	0.0	0.0	0.6	3.7	5.8	2.7	36.2	0.0
	E	7-13	0.63	5.9	9	1.6	0.1	0.1	0.0	0.0	0.8	4.4	6.2	2.6	29.0	0.0
	Bt1	13-27	0.34	5.3	11	2.8	1.3	0.1	0.0	0.0	0.4	3.7	7.9	4.6	53.2	0.0
	Bt2	27-39	0.22	4.8	9	1.9	1.9	0.2	0.0	2.0	1.2	6.7	10.7	7.2	37.4	0.0
	Bt3	39-53	0.14	5.0	10	1.3	1.8	0.2	0.0	3.2	0.6	8.9	12.2	7.1	27.0	0.0
	BC	53-60	0.08	4.8	8	0.4	1.3	0.1	0.0	4.0	0.4	8.7	10.5	6.2	17.1	0.0
	C	60-73	0.08	5.0	9	0.7	1.5	0.2	0.0	3.6	1.4	8.1	10.5	7.4	22.9	0.0
	---	---	---	---	---	---	---	---	---	---	---	---	---	---	21.4[2]	---
McLaurin loamy fine sand:[1] (S90LA-61-4)	A	0-5	0.81	5.9	14	0.8	0.2	0.1	0.0	0.0	0.4	6.7	7.8	1.5	14.1	0.0
	EB	5-14	0.23	5.9	11	1.3	0.5	0.1	0.0	0.0	0.8	3.0	4.9	2.7	38.8	0.0
	Bt1	14-21	0.20	5.5	16	3.8	1.1	0.3	0.0	0.0	1.0	5.2	10.4	6.2	50.0	0.0
	Bt2	21-30	0.10	5.4	15	2.4	1.0	0.1	0.0	0.0	0.6	3.8	7.3	4.1	47.9	0.0
	Bt3	30-43	0.01	5.5	12	1.5	1.5	0.2	0.0	0.0	0.4	3.0	6.2	3.6	51.6	0.0
	B/E	43-55	0.10	5.1	16	0.6	0.8	0.2	0.1	1.0	0.2	5.2	6.9	2.9	24.6	1.4
	B't	55-85	0.21	5.2	15	1.6	0.7	0.1	0.0	0.6	0.8	4.4	6.8	3.8	35.3	0.0
	---	---	---	---	---	---	---	---	---	---	---	---	---	---	10.2[2]	---
Ouachita silt loam:[1] (S90LA-61-11)	A	0-4	2.72	4.9	33	1.2	0.9	0.2	0.0	2.6	0.4	11.1	13.4	5.3	17.2	0.0
	BE	4-11	0.96	5.0	27	0.3	0.6	0.1	0.0	2.6	1.0	11.8	12.8	4.6	7.8	0.0
	Bw1	11-23	0.49	4.9	20	0.6	1.4	0.2	0.0	4.4	1.0	9.9	12.1	7.6	18.2	0.0
	Bw2	23-40	0.16	4.9	30	0.2	1.5	0.3	0.1	7.2	1.8	14.8	16.9	11.1	12.4	0.6
	Bw3	40-62	0.10	4.9	26	0.1	1.3	0.2	0.1	7.4	1.4	14.1	15.8	10.5	10.8	0.6
	C	62-80	0.04	4.9	24	0.2	0.7	0.1	0.1	4.4	1.4	13.3	14.4	6.9	7.6	0.7
Sacul very fine sandy loam:[1] (S89LA-61-2)	A	0-4	2.95	4.8	17	1.5	0.7	0.2	0.0	2.4	1.0	11.1	13.5	5.8	17.8	0.0
	E	4-10	1.03	5.1	14	0.6	0.4	0.1	0.0	1.2	1.4	6.7	7.8	3.7	14.1	0.0
	Bt1	10-22	1.13	4.7	17	3.1	5.0	0.6	0.1	13.4	0.2	31.1	39.9	22.4	22.1	0.3
	Bt2	22-30	0.40	4.6	14	0.5	4.2	0.6	0.1	22.0	1.0	39.2	44.6	28.4	12.1	0.2
	Bt3	30-42	0.22	4.5	12	0.2	3.8	0.6	0.1	22.8	0.4	37.0	41.7	27.9	11.3	0.2
	Btg	42-67	0.11	4.5	11	0.3	3.0	0.5	0.2	23.0	0.6	32.6	36.6	27.6	10.9	0.5
	BCg	67-78	0.08	4.4	11	0.2	2.9	0.5	0.1	22.6	1.0	37.7	41.4	27.3	8.9	0.2
	C	78-84	0.10	4.1	36	0.2	1.9	0.6	0.1	24.2	0.0	37.6	40.5	27.0	6.9	0.2
	---	---	---	---	---	---	---	---	---	---	---	---	---	---	8.5[2]	---
Trep loamy fine sand:[1] (S90LA-61-7)	Ap	0-7	1.36	5.6	27	1.0	0.3	0.1	0.0	0.0	0.4	5.2	6.6	1.8	21.2	0.0
	E	7-27	0.12	5.4	15	0.4	0.1	0.0	0.0	0.0	0.6	2.9	3.4	1.1	14.7	0.0
	Bt1	27-37	0.08	5.1	18	1.4	0.8	0.1	0.0	1.0	1.0	6.7	9.0	4.3	25.6	0.0
	Bt2	37-52	0.01	5.0	15	0.7	1.7	0.1	0.0	1.8	0.2	6.1	8.6	4.5	29.1	0.0
	Bt3	52-72	0.01	5.1	15	0.4	1.7	0.1	0.0	2.0	0.8	6.7	8.9	5.0	24.7	0.0
	---	---	---	---	---	---	---	---	---	---	---	---	---	---	28.8[2]	---

See footnotes at end of table.

TABLE 17.--FERTILITY TEST DATA FOR SELECTED SOILS--Continued

Soil name and sample number	Horizon	Depth	Organic matter content	pH 1:1 H_2O	Extractable phosphorus	Exchangeable cations: Ca	Mg	K	Na	Al	H	Total acidity	Cation-exchange capacity (sum)	Cation-exchange capacity (effective)	Base saturation (sum)	Satur... Sum of cation-exchange capacity: Na
		In	Pct		Ppm	Milliequivalents/100 grams of soil									Pct	Pct
SND:[3]	A	0-7	1.93	4.8	90	2.5	1.1	0.2	0.1	1.0	1.0	11.8	15.7	5.9	24.8	0.6
(S90LA-61-10)	Eg1	7-16	1.10	4.6	29	1.8	1.0	0.1	0.2	2.8	1.6	12.6	15.7	7.5	19.7	1.3
	Eg2	16-28	0.47	5.0	27	1.8	1.3	0.1	0.2	3.0	2.4	12.1	15.5	8.8	21.9	1.3
	B/E	28-45	0.28	4.9	24	1.2	1.1	0.1	0.3	4.4	0.6	12.6	15.3	7.7	17.6	2.0
	Btg1	45-60	0.11	4.9	13	0.6	0.8	0.1	0.9	5.2	0.8	11.8	14.2	8.4	16.9	6.3
	Btg2	60-86	0.18	4.8	13	0.6	0.8	0.1	2.1	7.4	2.0	12.8	16.4	13.0	22.0	12.8
	---	---	---	---	---	---	---	---	---	---	---	---	---	---	22.0[2]	---

[1] Typical pedon for the series. For the description and location, see the section "Soil Series and Their Morphology

[2] Base saturation at the critical depth for taxonomic placement at the order level.

[3] Series not designated. This pedon is classified as Ultisols. It is mapped as a similar soil in map unit GyA, Guy silt loams, frequently flooded. The sample site is about 2.3 miles east of Choudrant, 3,320 feet north and 3,930 feet e southwest corner of sec. 28, T. 18 N., R. 1 W.

TABLE 18.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Angie	Clayey, mixed, thermic Aquic Paleudults
Betis	Sandy, siliceous, thermic Psammentic Paleudults
Bowie	Fine-loamy, siliceous, thermic Plinthic Paleudults
Briley	Loamy, siliceous, thermic Arenic Paleudults
Cahaba	Fine-loamy, siliceous, thermic Typic Hapludults
Darbonne	Fine-loamy, siliceous, thermic Typic Paleudalfs
Darley	Clayey, kaolinitic, thermic Typic Hapludults
Dela	Coarse-loamy, siliceous, nonacid, thermic Typic Udifluvents
Dubach	Fine-loamy, siliceous, thermic Plinthic Paleudults
Gurdon	Coarse-silty, siliceous, thermic Aquic Paleudults
Guyton	Fine-silty, siliceous, thermic Typic Glossaqualfs
Iuka	Coarse-loamy, siliceous, acid, thermic Aquic Udifluvents
Mahan	Clayey, kaolinitic, thermic Typic Hapludults
McLaurin	Coarse-loamy, siliceous, thermic Typic Paleudults
Ouachita	Fine-silty, siliceous, thermic Fluventic Dystrochrepts
Sacul	Clayey, mixed, thermic Aquic Hapludults
Trep	Loamy, siliceous, thermic Arenic Paleudults

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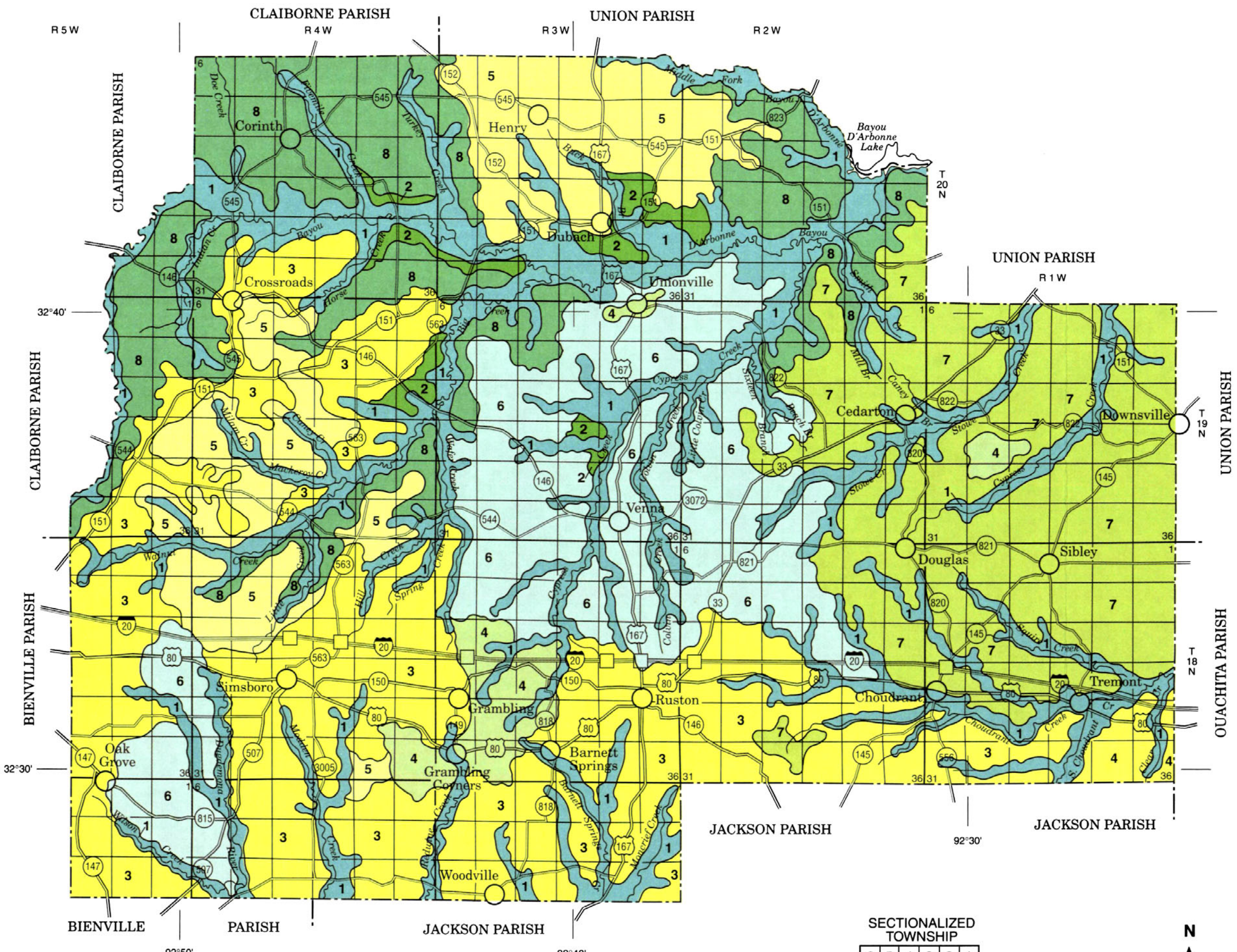


SOIL LEGEND*

SOILS ON FLOOD PLAINS

1 Guyton-Iuka-Ouachita

SOILS ON STREAM TERRACES

2 Dubach-Gurdon

SOILS ON UPLANDS

3 Sacul-Bowie

4 McLaurin-Betis

5 Darley-Bowie

6 Darley-Mahan

7 McLaurin-Briley-Darley

8 Sacul-Darley

* The units on this legend are described in the text under the heading "General Soil Map Units."

Compiled 1991

UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
LOUISIANA AGRICULTURAL EXPERIMENT STATION
LOUISIANA STATE SOIL AND WATER CONSERVATION COMMITTEE
LOUISIANA TECH UNIVERSITY, COLLEGE OF LIFE SCIENCES

GENERAL SOIL MAP

LINCOLN PARISH, LOUISIANA

Scale 1 : 190,080

1 0 1 2 3 Miles

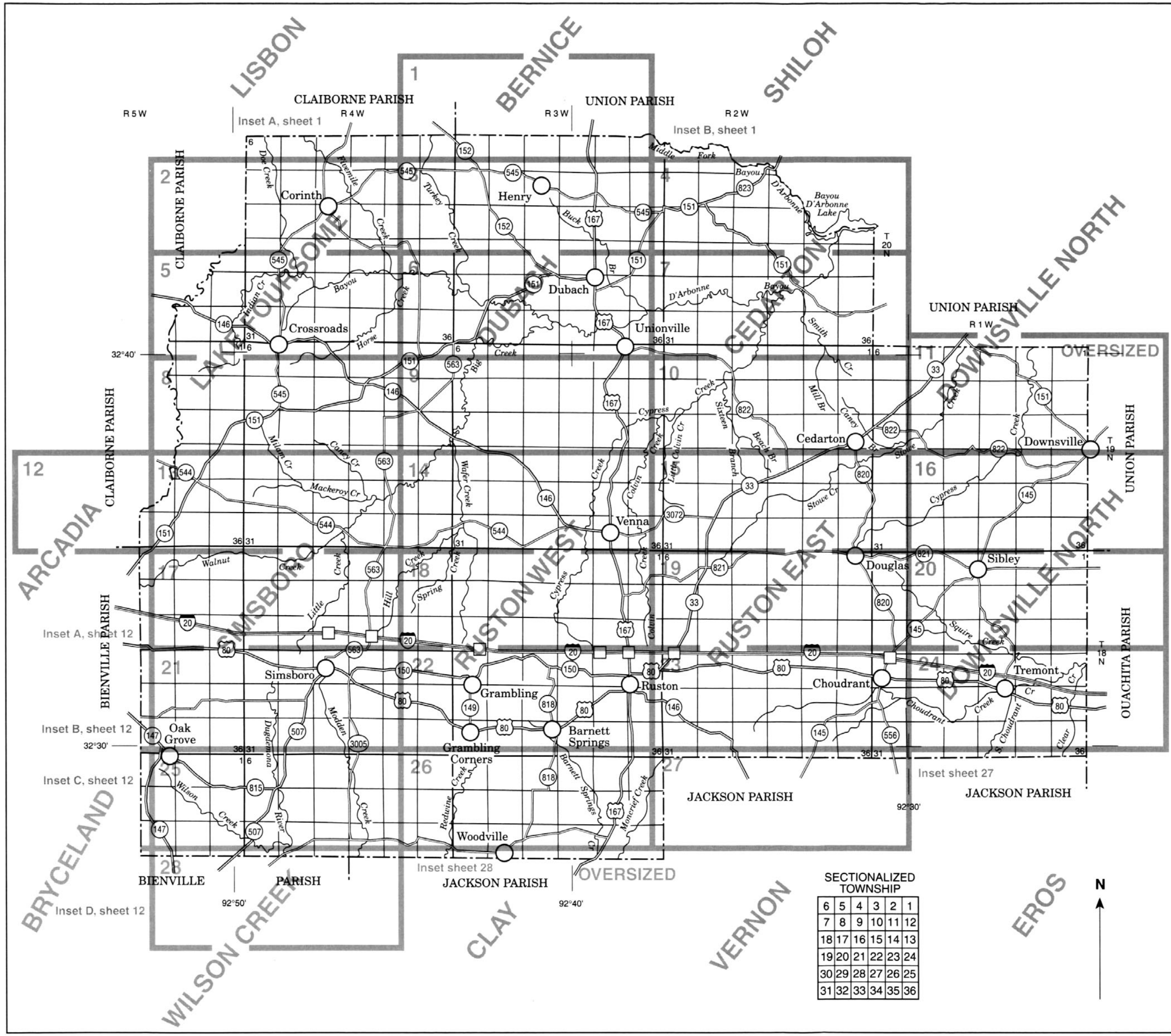
1 0 3 6 Km

N

SECTIONALIZED TOWNSHIP

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.



INDEX TO MAP SHEETS

LINCOLN PARISH, LOUISIANA

Scale 1 : 190,080

SECTIONALIZED TOWNSHIP

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

SOIL LEGEND

Soil map symbols and map unit names are alphabetical. Map symbols are letters. The first letter, always a capital, is the initial letter of the soil series name. The second letter is a small letter except in order three map units, in which case it is a capital letter. The third letter is a capital letter used to indicate slope.

SYMBOL	NAME
AnB	Angie very fine sandy loam, 1 to 3 percent slopes
BeC	Betis loamy fine sand, 1 to 5 percent slopes
BEE	Betis loamy fine sand, 5 to 12 percent slopes*
BoC	Bowie fine sandy loam, 1 to 5 percent slopes
BoD	Bowie fine sandy loam, 5 to 8 percent slopes
BrC	Briley loamy fine sand, 1 to 5 percent slopes
ChB	Cahaba fine sandy loam, 1 to 3 percent slopes
DbC	Darbonne loamy fine sand, 1 to 5 percent slopes
DrC	Darley gravelly fine sandy loam, 1 to 5 percent slopes
DRE	Darley gravelly fine sandy loam, 5 to 12 percent slopes*
DRF	Darely-Sacul Association, 12 to 30 percent slopes*
DuC	Dubach fine sandy loam, 1 to 5 percent slopes
GrB	Gurdon silt loam, 1 to 3 percent slopes
GyA	Guyton-Ouachita silt loams, frequently flooded*
IUA	Iuka-Dela Association, frequently flooded*
MhC	Mahan fine sandy loam, 1 to 5 percent slopes
MHE	Mahan fine sandy loam, 5 to 12 percent slopes
MmB	McLaurin loamy fine sand, 1 to 3 percent slopes
ScC	Sacul very fine sandy loam, 1 to 5 percent slopes
SCE	Sacul very fine sandy loam, 5 to 12 percent slopes*
TpC	Trep loamy fine sand, 1 to 5 percent slopes

*Order three map units. Fewer soil examinations were made in these mapping units, and delineations and included areas are generally larger. The mapping units were designed primarily for management of woodland and wildlife habitat management.

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

- National, state, or province
- County or parish
- Minor civil division
- Reservation (national forest or park, state forest or park, and large airport)
- Land grant
- Limit of soil survey (label)
- Field sheet matchline and neatline

AD HOC BOUNDARY (label) — Davis Airstrip

- Small airport, airfield, park, oilfield, cemetery, or flood pool — FLOOD POOL LINE

STATE COORDINATE TICK
1 890 000 FEET

LAND DIVISION CORNER
(sections and land grants)

ROADS

- Divided (median shown if scale permits)
- Other roads
- Trail

ROAD EMBLEM & DESIGNATIONS

- Interstate — 173
- Federal — 287
- State — 52
- County, farm or ranch — 1283

RAILROAD

POWER TRANSMISSION LINE
(normally not shown)

PIPE LINE (normally not shown)

FENCE (normally not shown)

LEVEES

- Without road
- With road
- With railroad

DAMS

- Large (to scale)
- Medium or Small (Named where applicable) — water

PITS

- Gravel pit
- Mine or quarry

MISCELLANEOUS CULTURAL FEATURES

- Farmstead, house (omit in urban area) (occupied)
- Church
- School
- Indian mound (label) — Indian Mound
- Located object (label) — Tower
- Tank (label) — Gas
- Wells, oil or gas
- Windmill
- Kitchen midden

WATER FEATURES

DRAINAGE

- Perennial, double line
- Perennial, single line
- Intermittent
- Drainage end
- Canals or ditches
  - Double-line (label) — CANAL
  - Drainage and/or irrigation

LAKES, PONDS AND RESERVOIRS

- Perennial — water
- Intermittent — int

MISCELLANEOUS WATER FEATURES

- Marsh or swamp
- Spring
- Well, artesian
- Well, irrigation
- Wet spot

SPECIAL SYMBOLS FOR SOIL SURVEY

SOIL DELINEATIONS AND SYMBOLS — BEE DbC

ESCARPMENTS

- Bedrock (points down slope)
- Other than bedrock (points down slope)

SHORT STEEP SLOPE

GULLY

DEPRESSION OR SINK

SOIL SAMPLE (normally not shown)

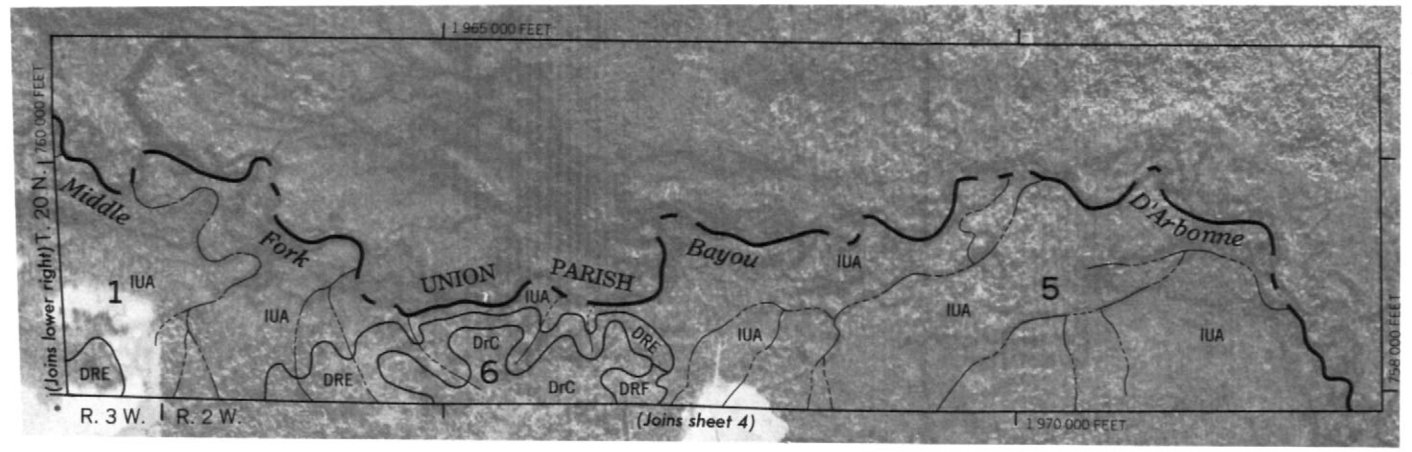
MISCELLANEOUS

- Blowout
- Clay spot
- Gravelly spot
- Gumbo, slick or scabby spot (sodic)
- Dumps and other similar non soil areas
- Prominent hill or peak
- Rock outcrop (includes sandstone and shale)
- Saline spot
- Sandy spot
- Severely eroded spot
- Slide or slip (tips point upslope)
- Stony spot, very stony spot

1

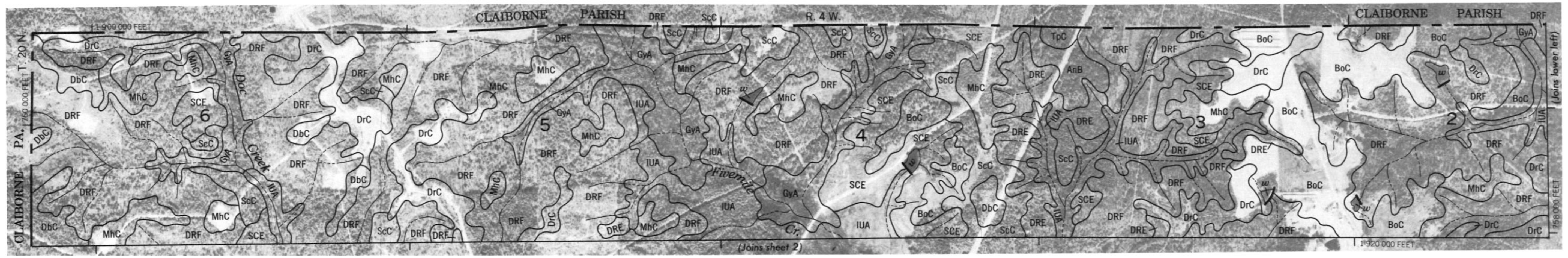
N

INSET A

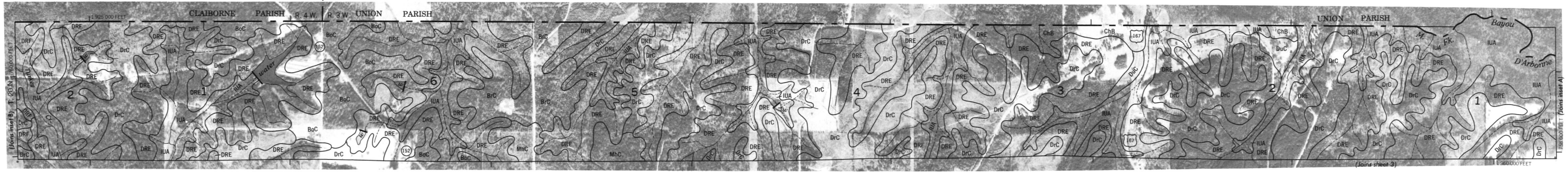


2000 AND 5000-FOOT GRID TICKS

INSET B



2000 AND 5000-FOOT GRID TICKS



2000 AND 5000-FOOT GRID TICKS

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1983 - 1985 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

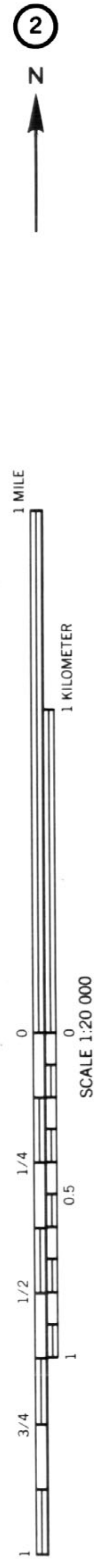
LINCOLN PARISH, LOUISIANA NO. 1

SCALE 1:20 000

1 MILE

1 KILOMETER

SOIL SURVEY OF LINCOLN PARISH, LOUISIANA - SHEET NUMBER 2



LINCOLN PARISH, LOUISIANA NO. 2

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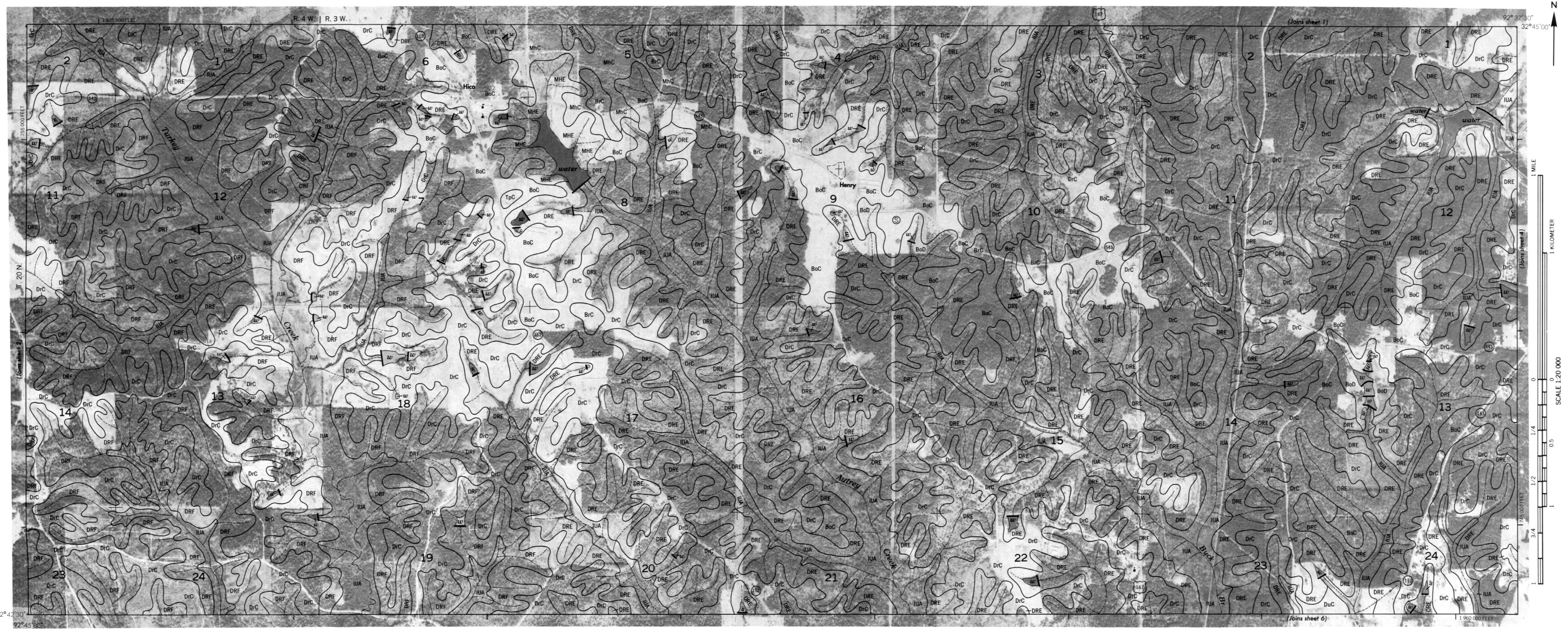
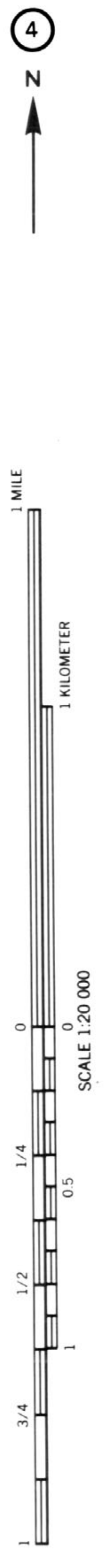
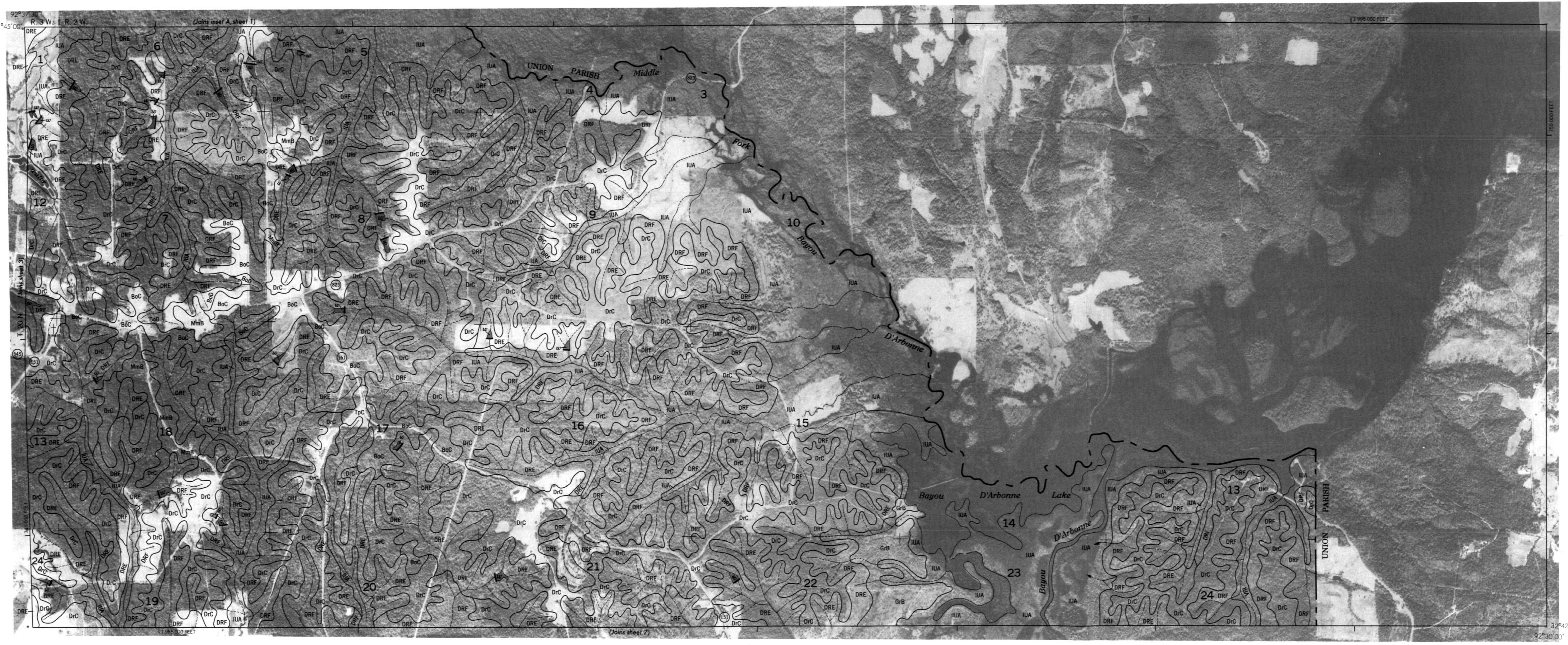
LINCOLN PARISH, LOUISIANA NO. 3







LINCOLN PARISH, LOUISIANA NO. 4

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1983-1985 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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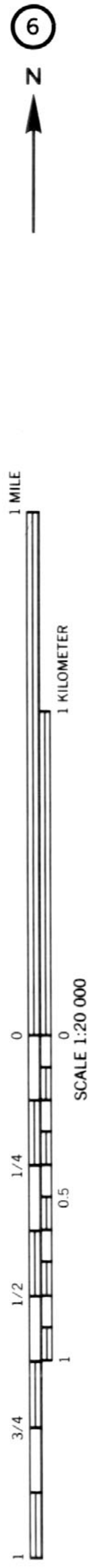
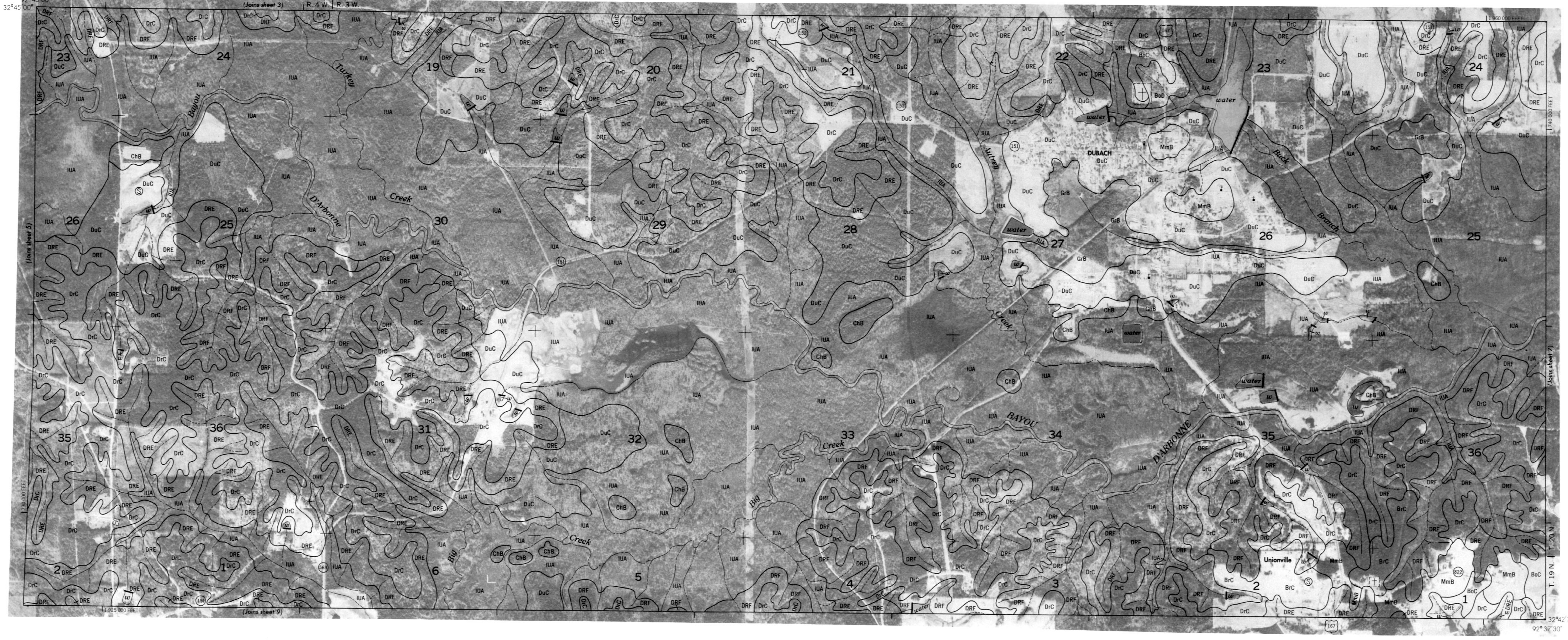
LINCOLN PARISH, LOUISIANA NO. 5





LINCOLN PARISH, LOUISIANA NO. 6

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1983-1985 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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LINCOLN PARISH, LOUISIANA NO. 7

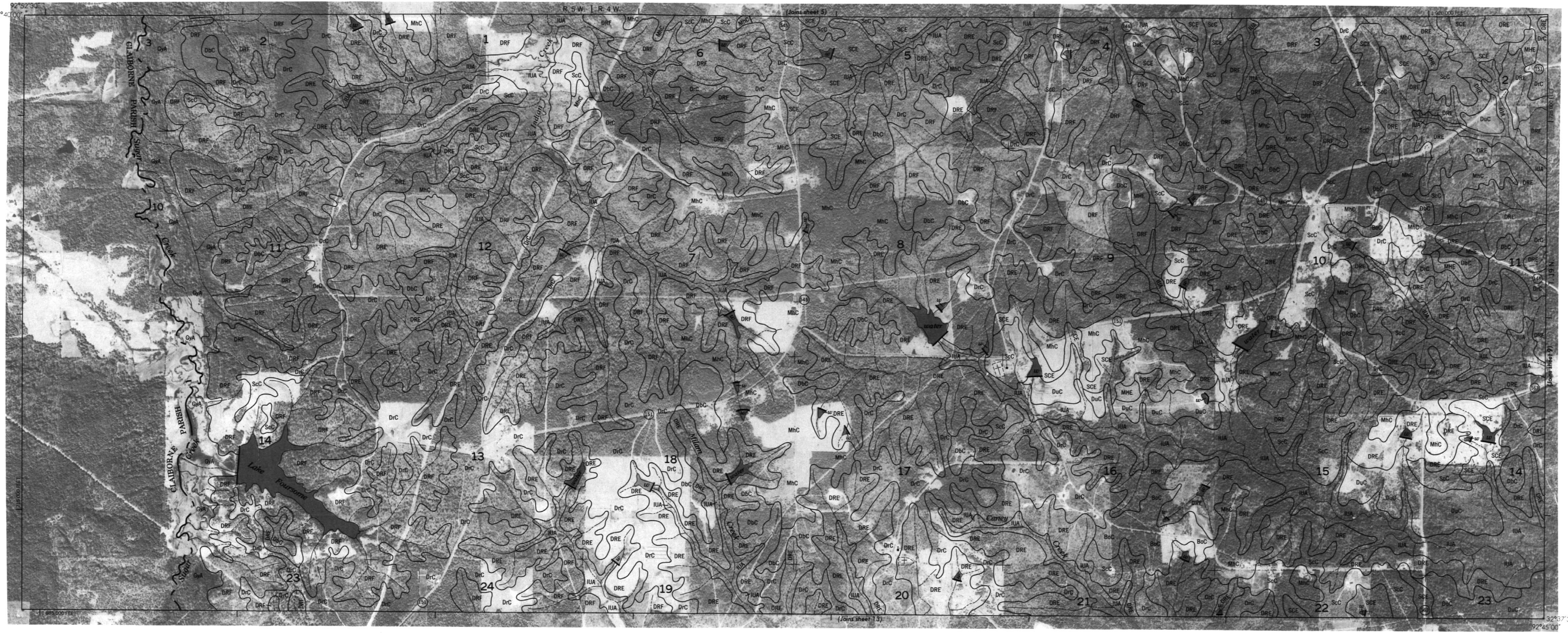
8

N

1 MILE

1 KILOMETER

SCALE 1:20 000

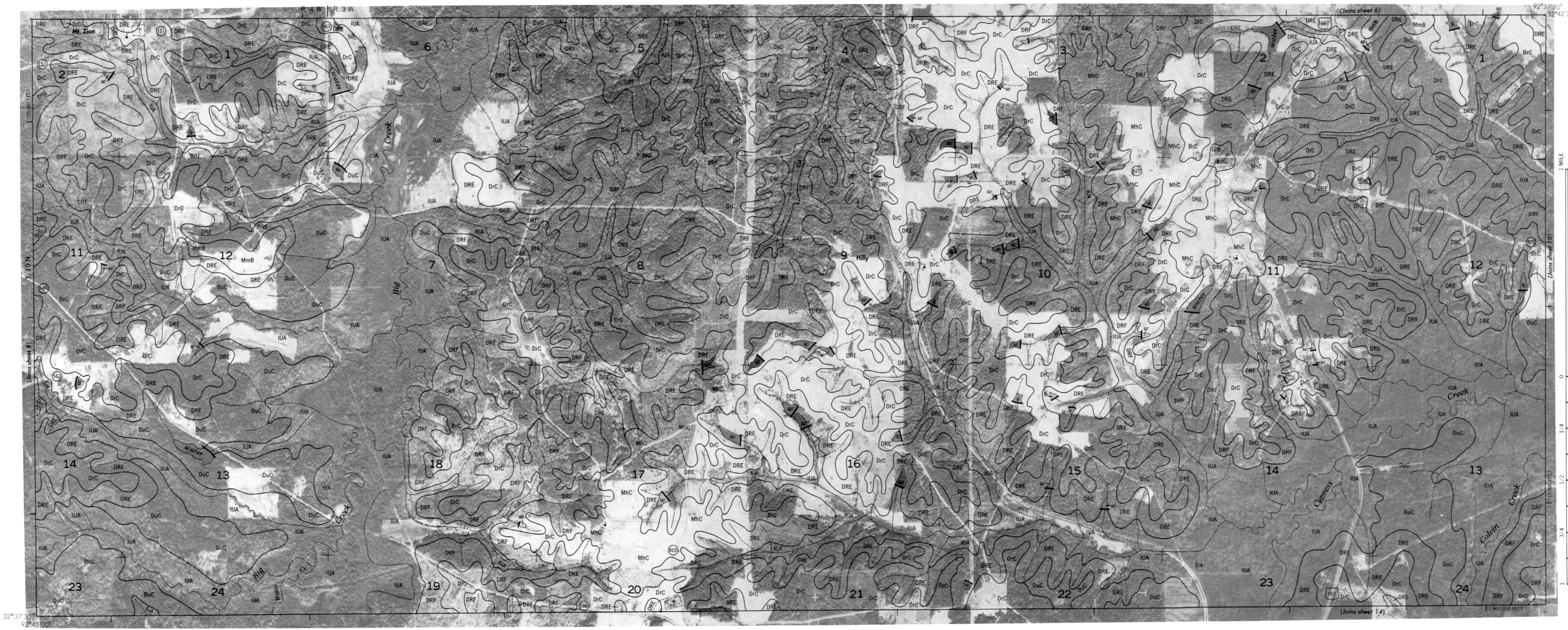


LINCOLN PARISH, LOUISIANA NO. 8

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1983-1985 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

9

N



1 MILE

1 KILOMETER

SCALE 1:20 000

0 1/4 1/2 3/4 1

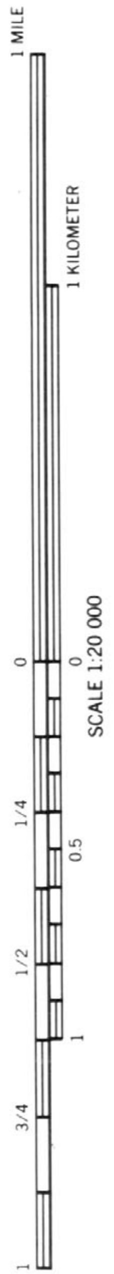
0 0.5 1

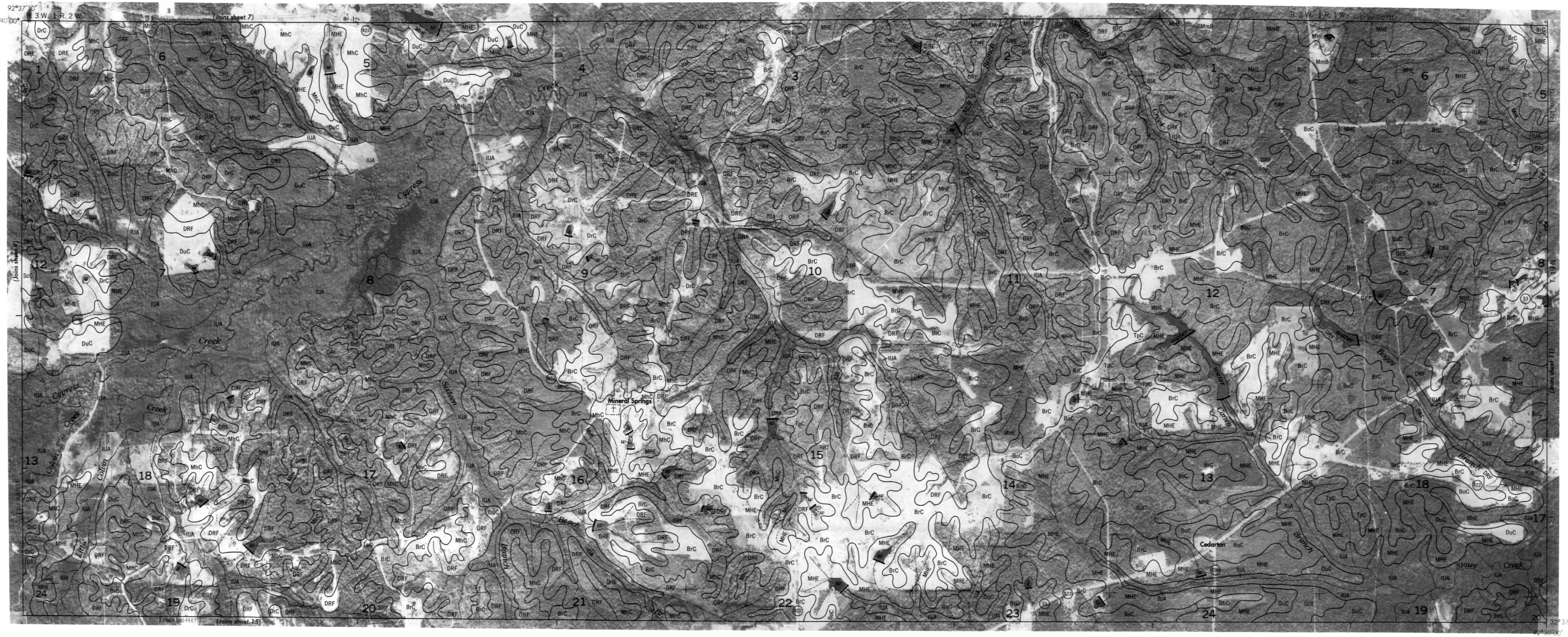
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1983 - 1985 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

LINCOLN PARISH, LOUISIANA NO. 9

SOIL SURVEY OF LINCOLN PARISH, LOUISIANA - SHEET NUMBER 10

N

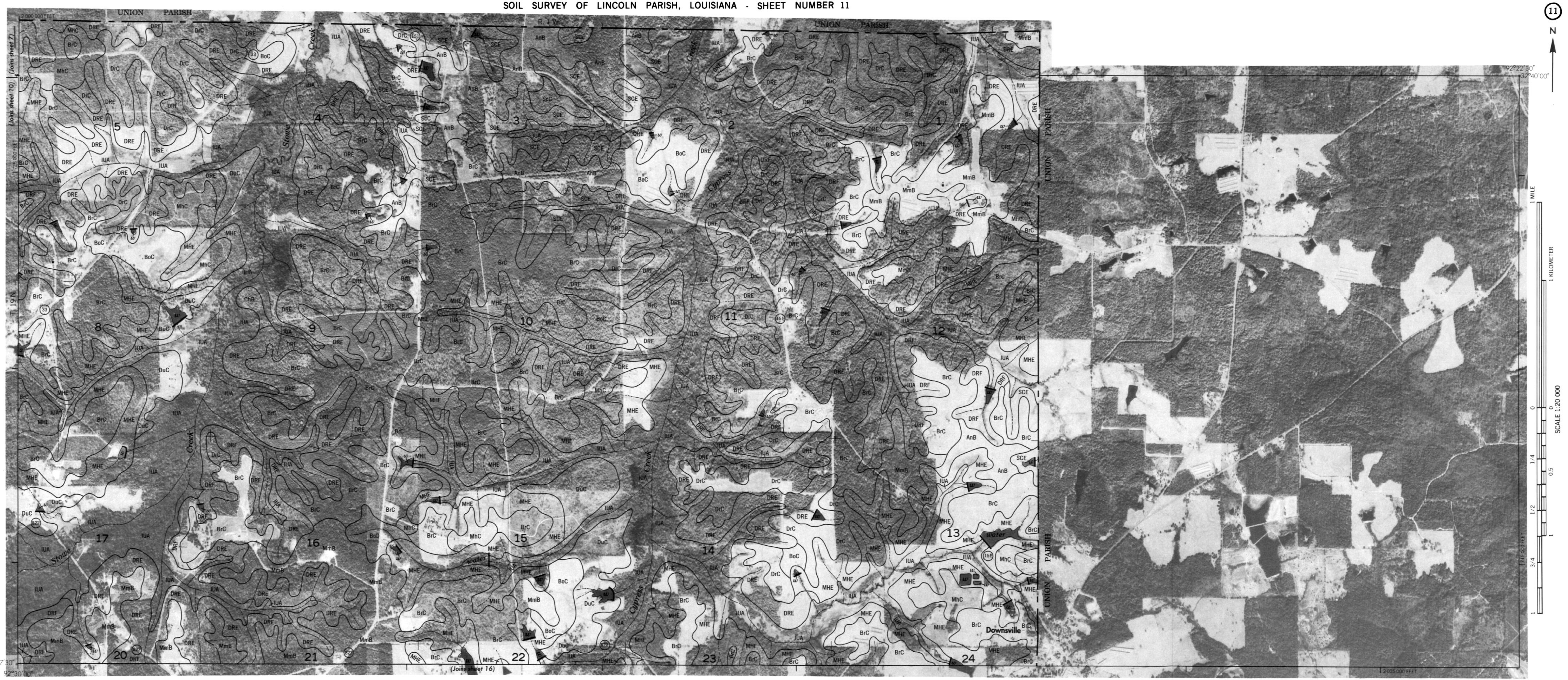




LINCOLN PARISH, LOUISIANA NO. 10

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1983-1985 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

SOIL SURVEY OF LINCOLN PARISH, LOUISIANA - SHEET NUMBER 11

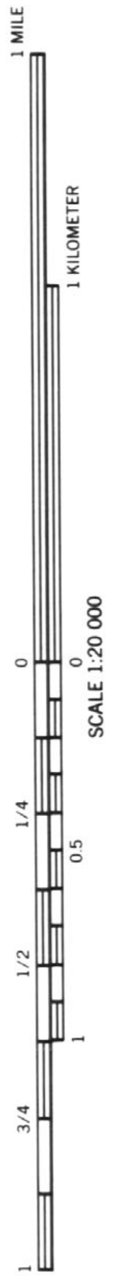


This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1983-1985 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

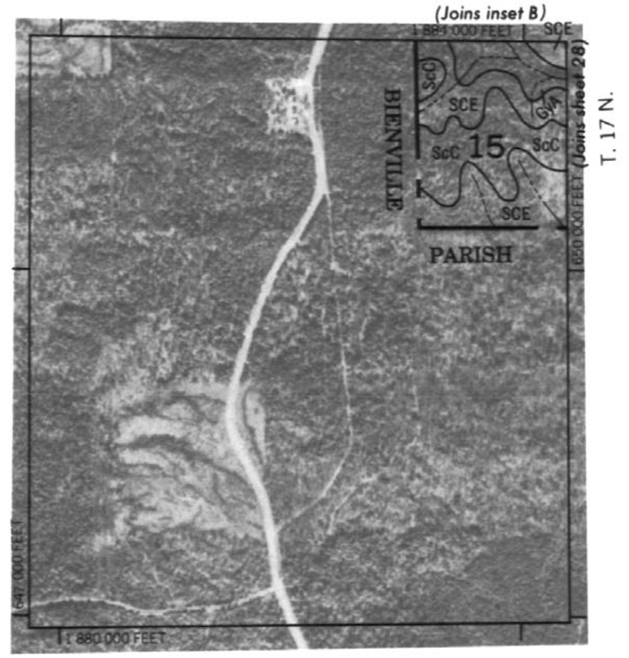
LINCOLN PARISH, LOUISIANA NO. 11

SOIL SURVEY OF LINCOLN PARISH, LOUISIANA - SHEET NUMBER 12

N

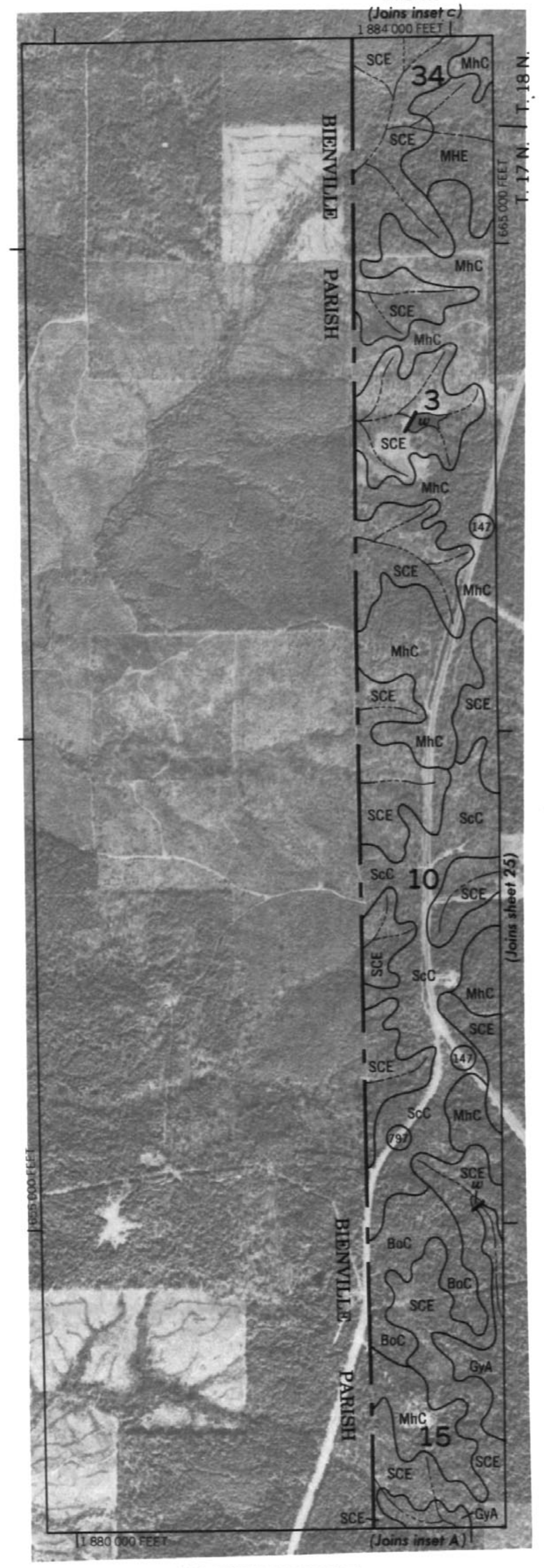


INSET A



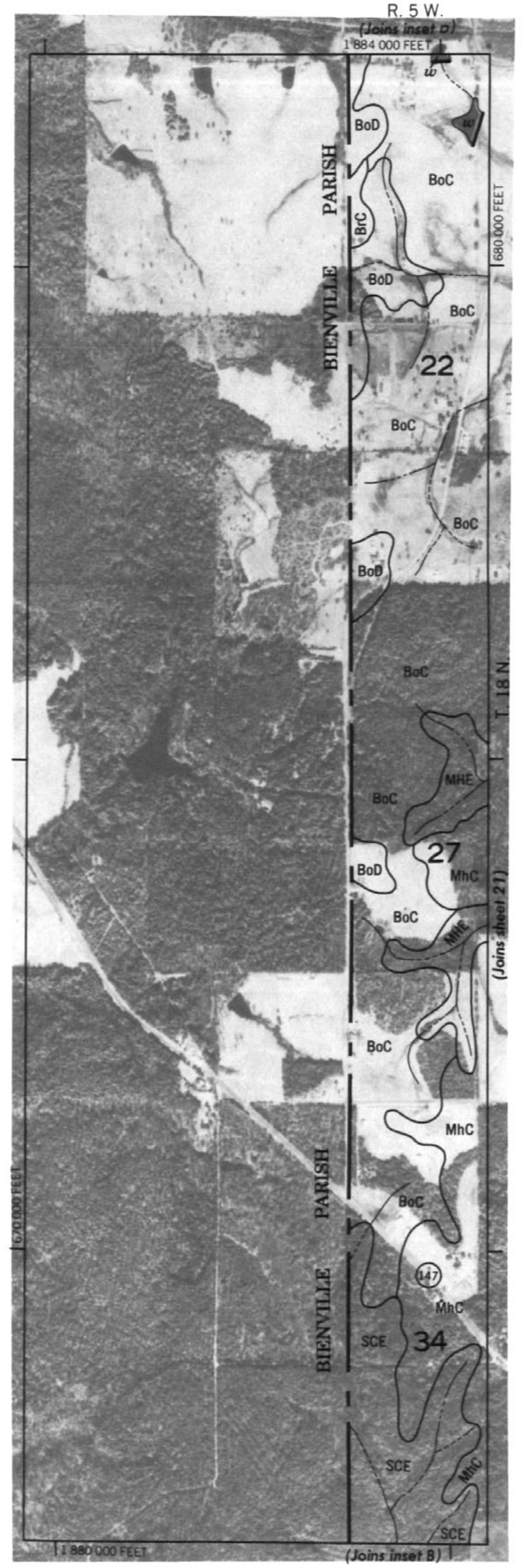
3000 AND 4000-FOOT GRID TICKS

INSET B



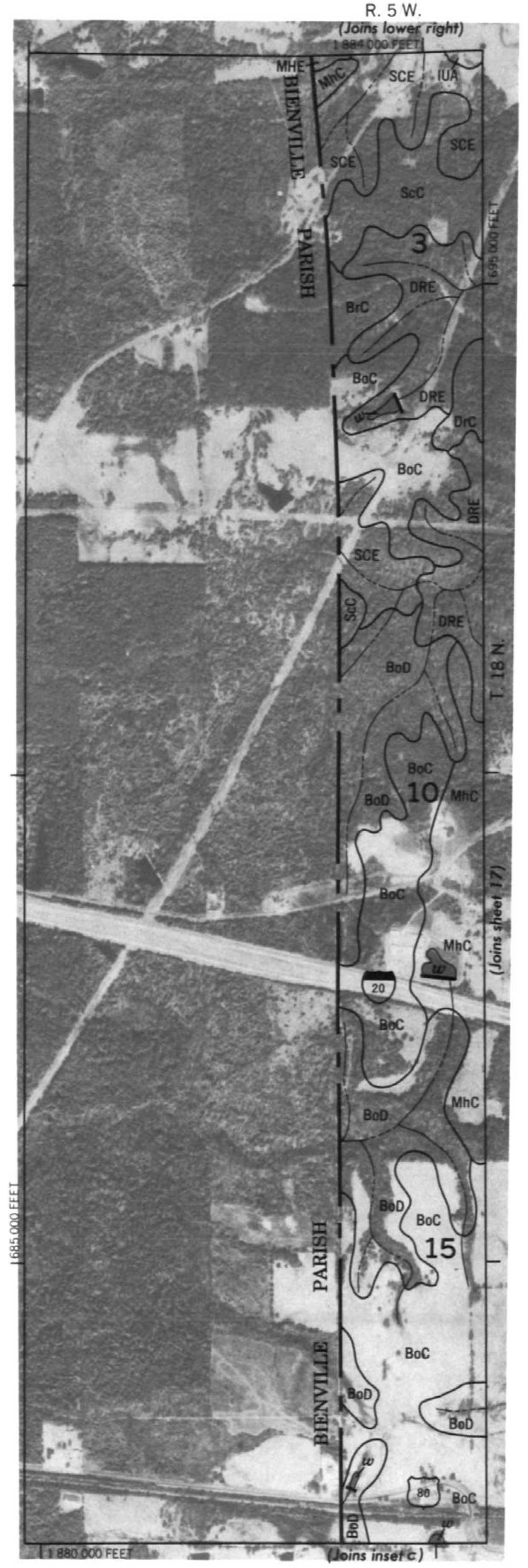
4000 AND 5000-FOOT GRID TICKS

INSET C

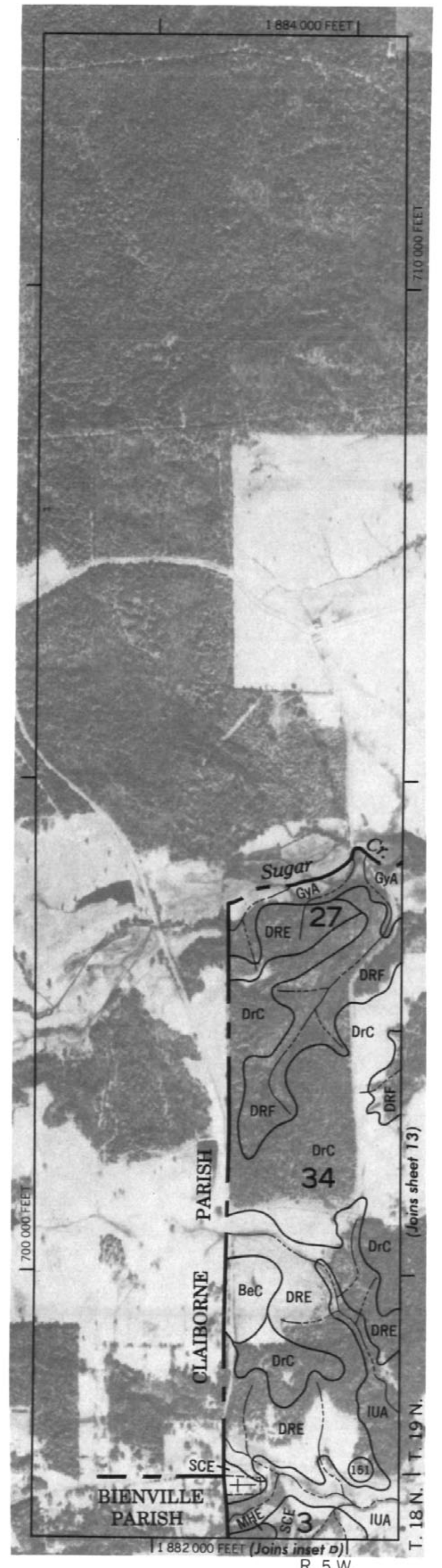


4000 AND 5000-FOOT GRID TICKS

INSET D



4000 AND 5000-FOOT GRID TICKS



2000 AND 5000-FOOT GRID TICKS

LINCOLN PARISH, LOUISIANA NO. 12

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N

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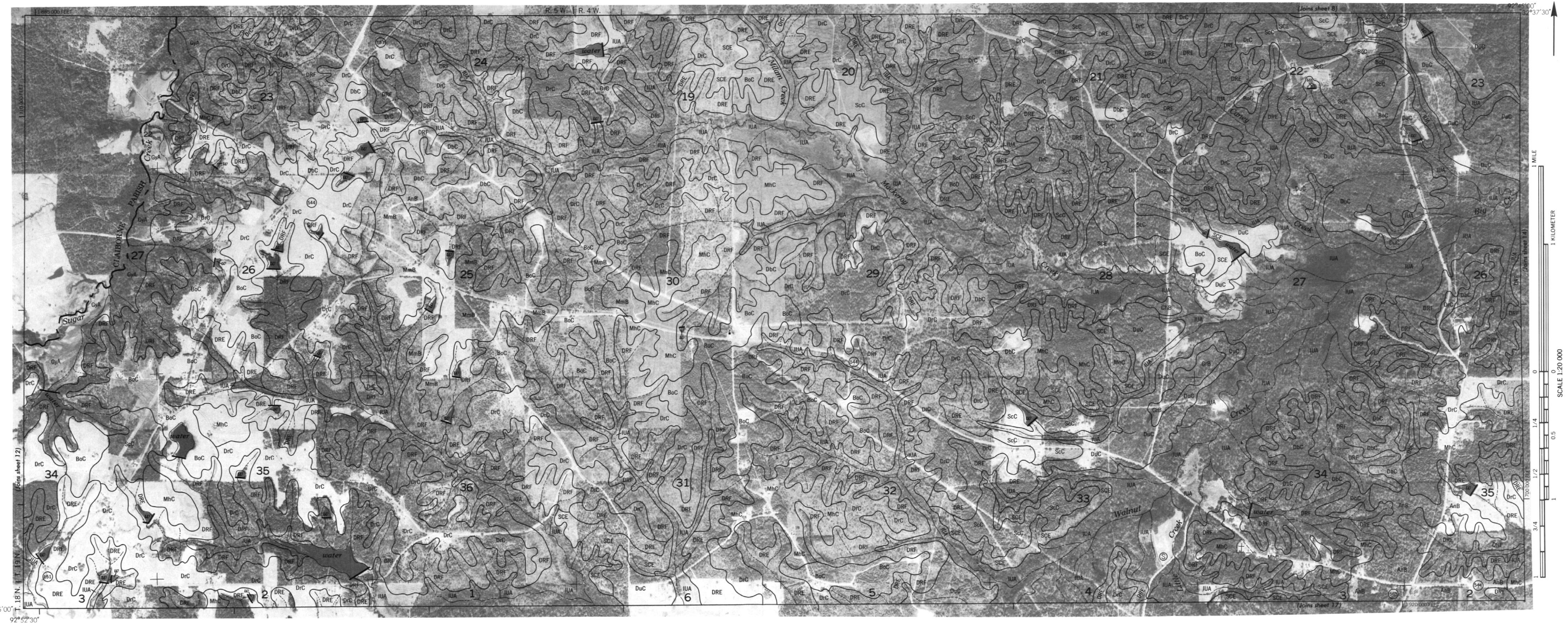
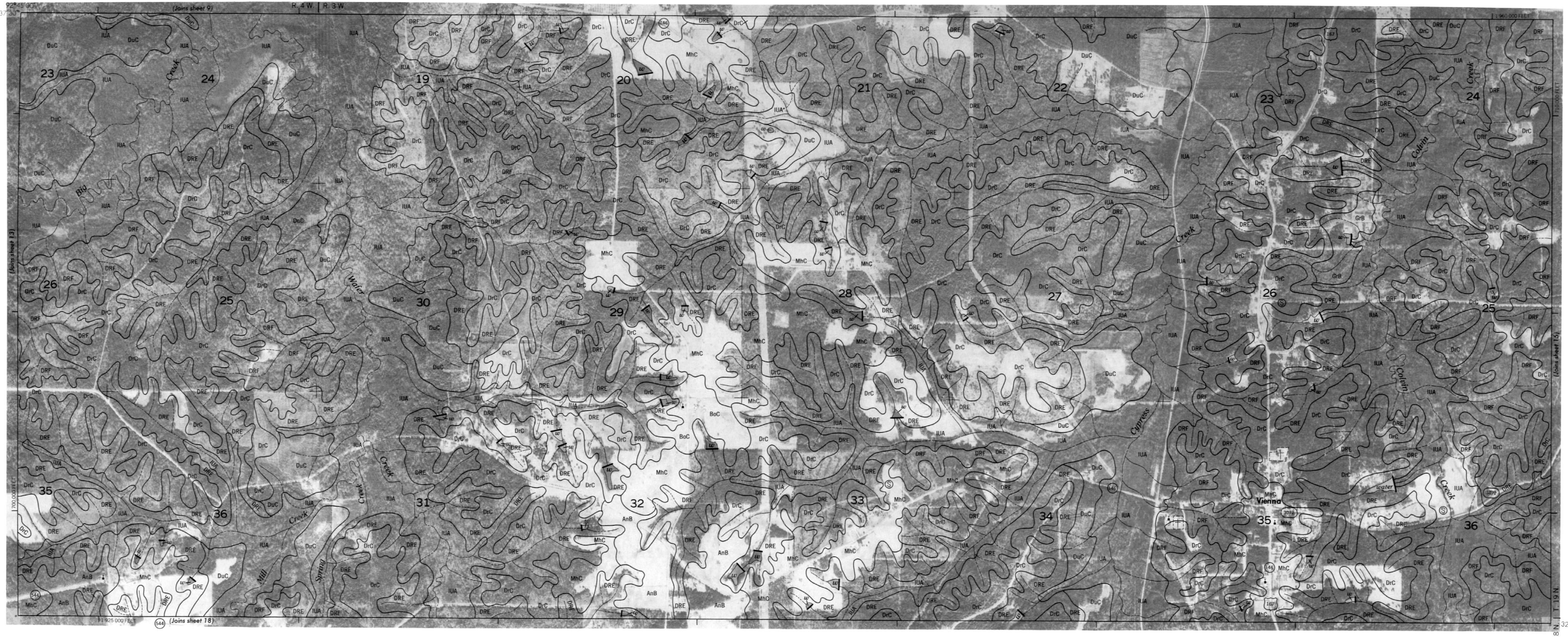
LINCOLN PARISH, LOUISIANA NO. 13



(14)

N



SCALE 1:20 000

1 MILE | 3/4 | 1/2 | 1/4 | 0

1 KILOMETER | 1 | 0.5 | 0

LINCOLN PARISH, LOUISIANA NO. 14

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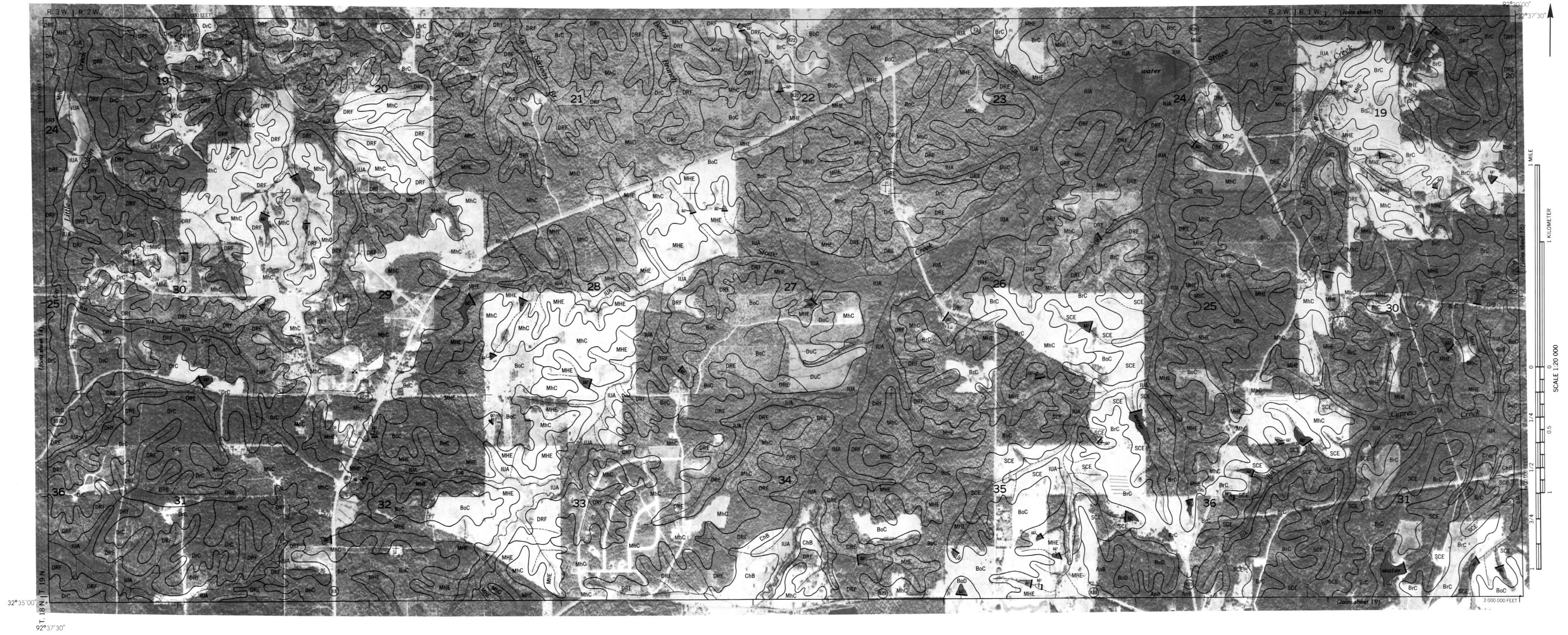
LINCOLN PARISH, LOUISIANA NO. 15

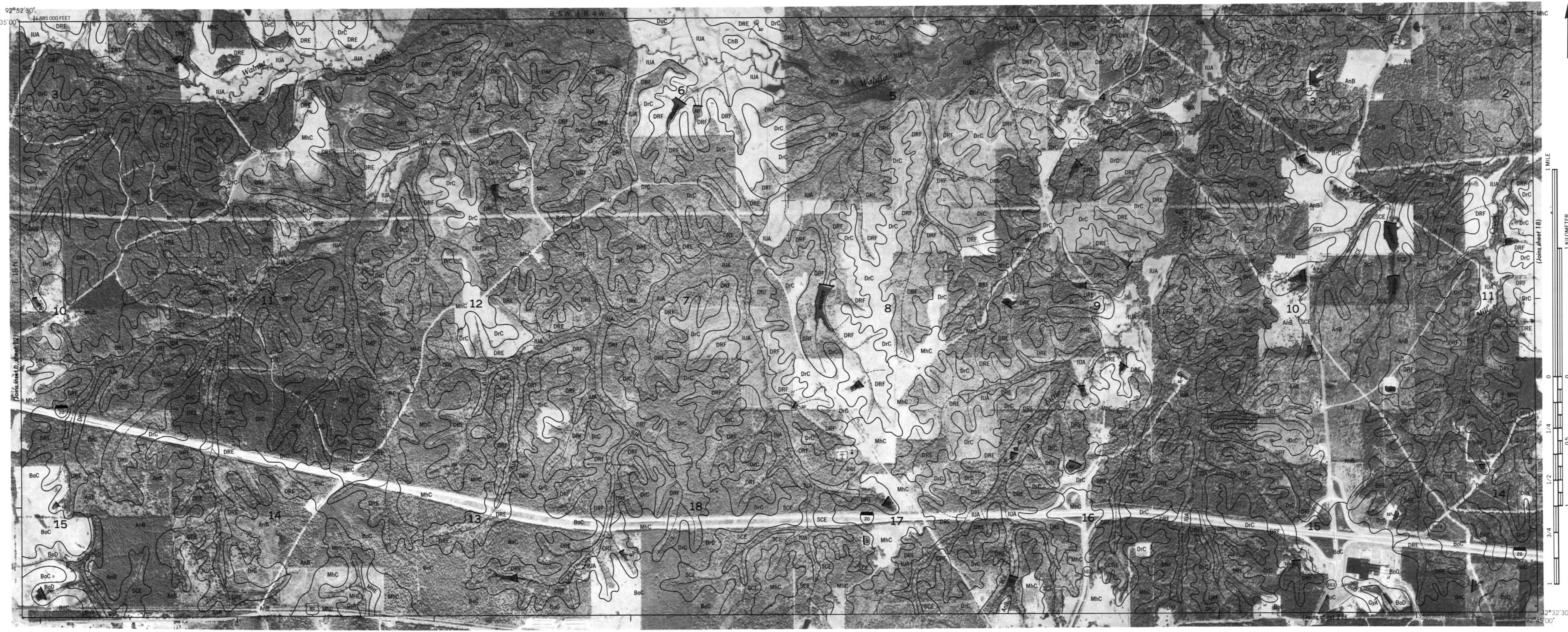


LINCOLN PARISH, LOUISIANA NO. 16

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1983 - 1985 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

17

N



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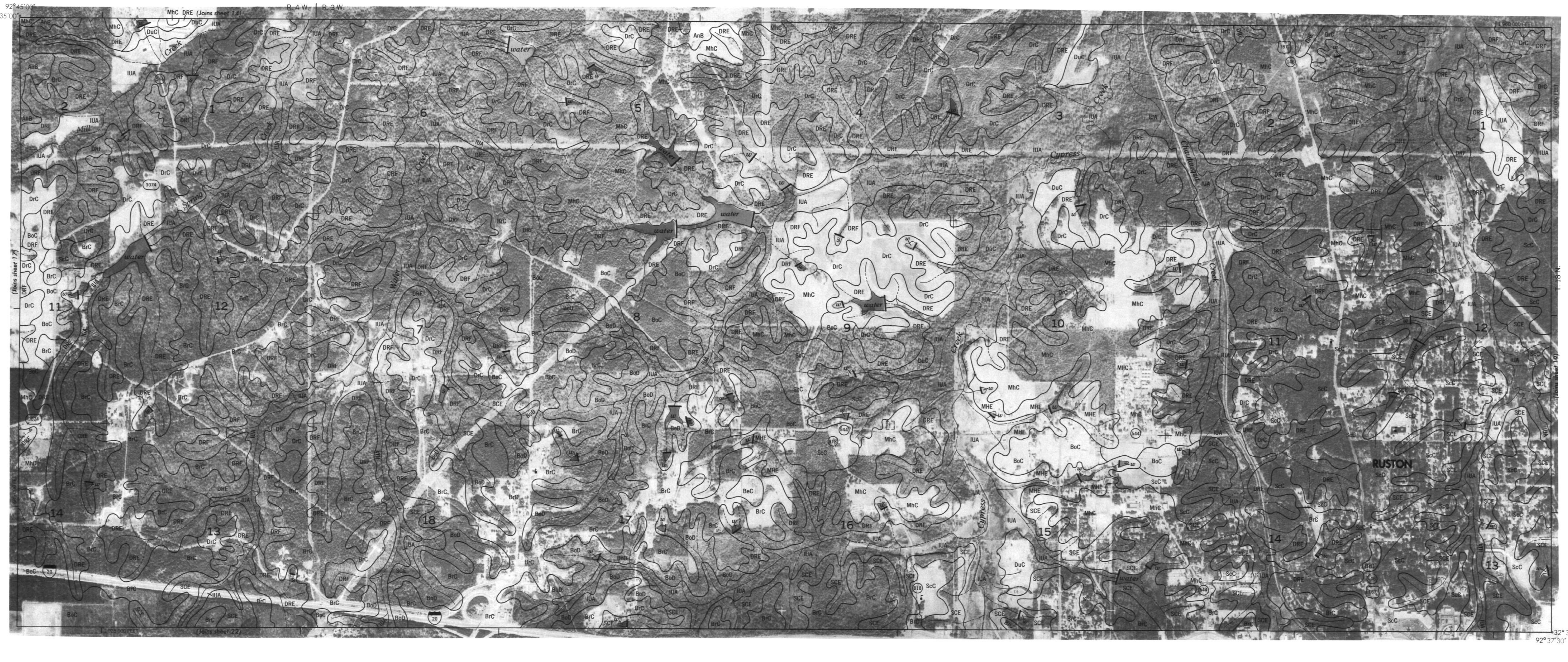
LINCOLN PARISH, LOUISIANA NO. 17

N

SOIL SURVEY OF LINCOLN PARISH, LOUISIANA - SHEET NUMBER 18



1 MILE
1 KILOMETER
0 1/4 1/2 3/4 1
0 0.5 1
SCALE 1:20 000

LINCOLN PARISH, LOUISIANA NO. 18

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19

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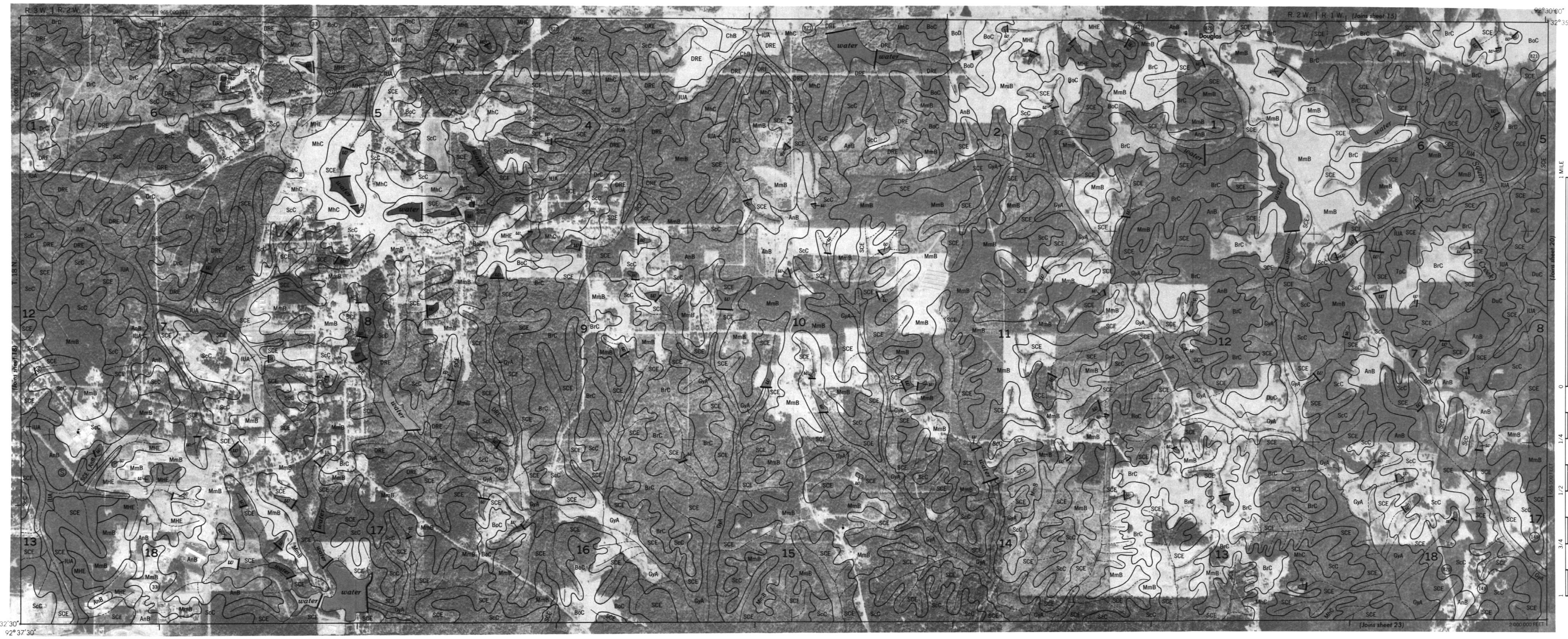
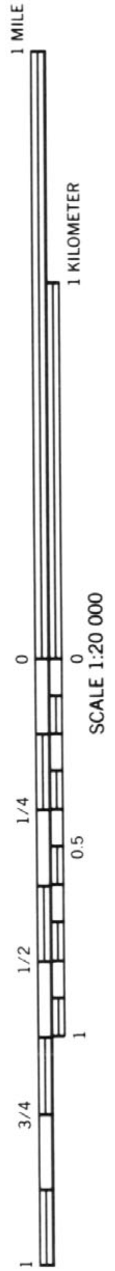
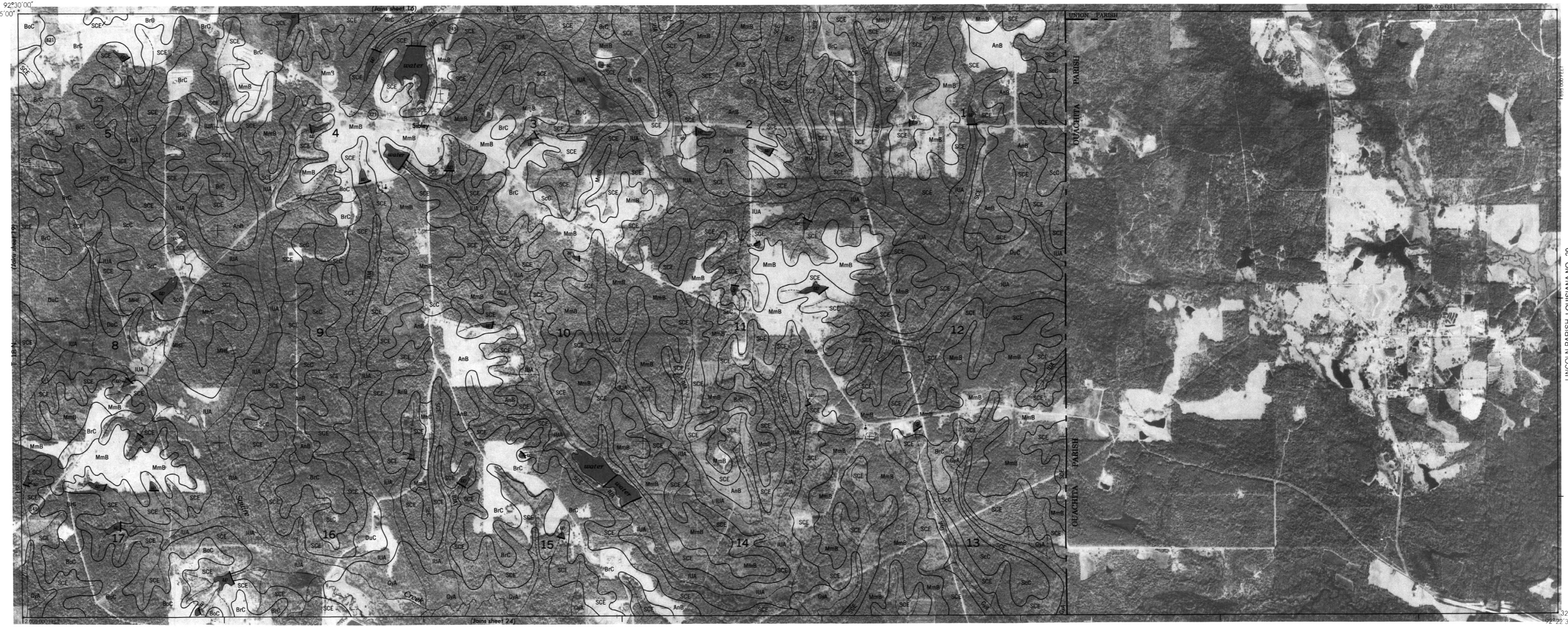
LINCOLN PARISH, LOUISIANA NO. 19



20

N





LINCOLN PARISH, LOUISIANA NO. 20

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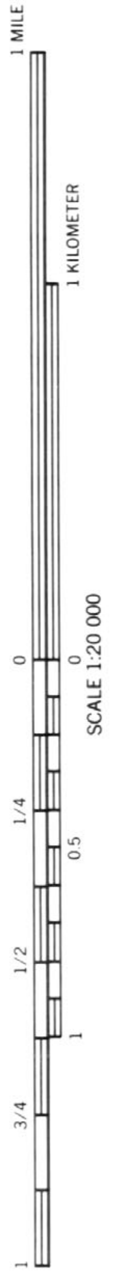
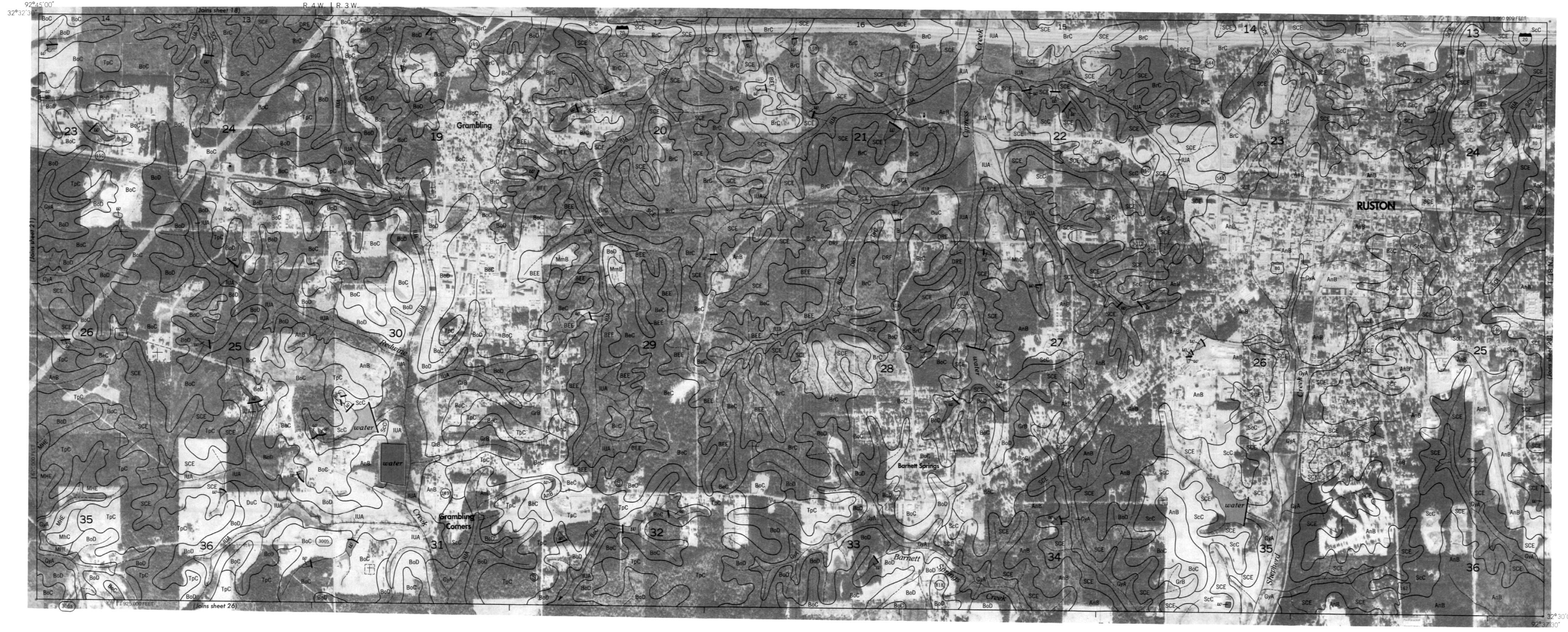
N

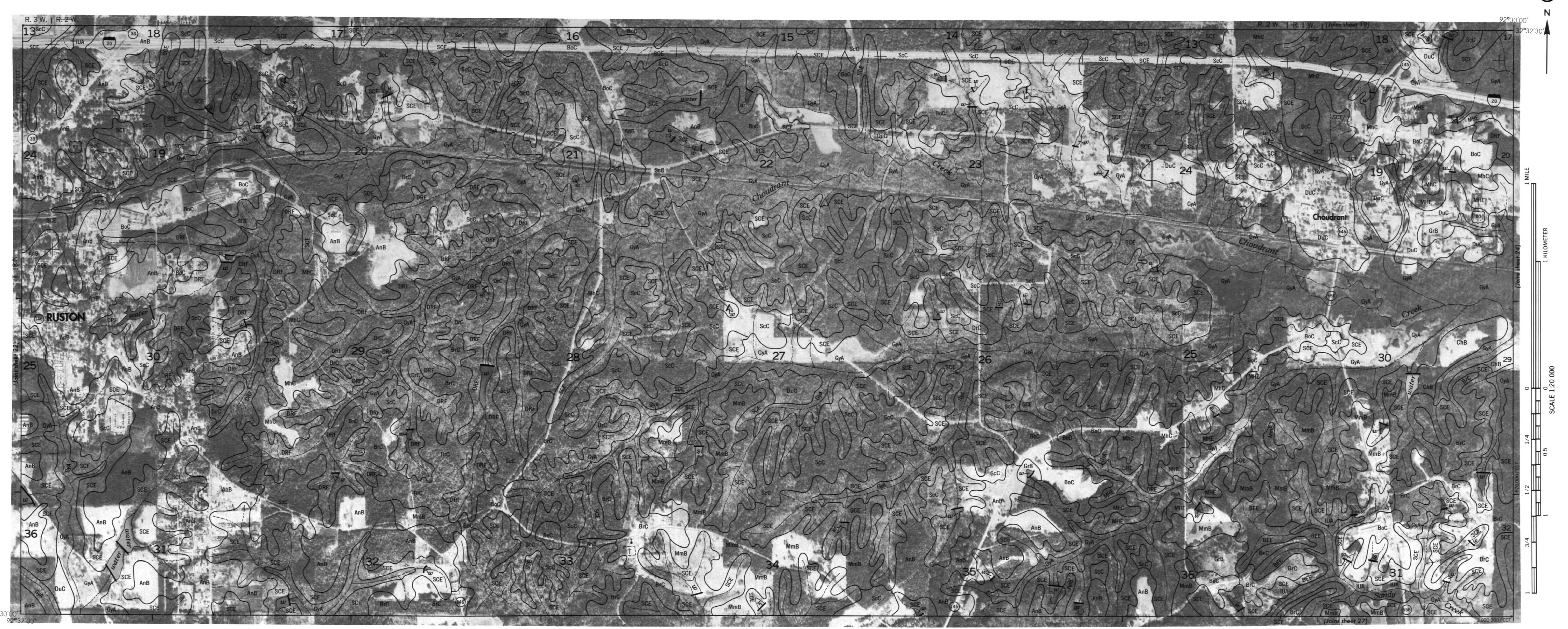




LINCOLN PARISH, LOUISIANA NO. 22

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1983-1985 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

23



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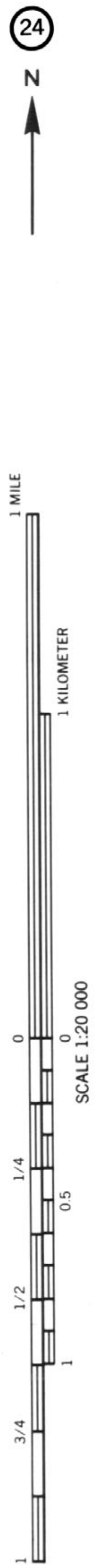

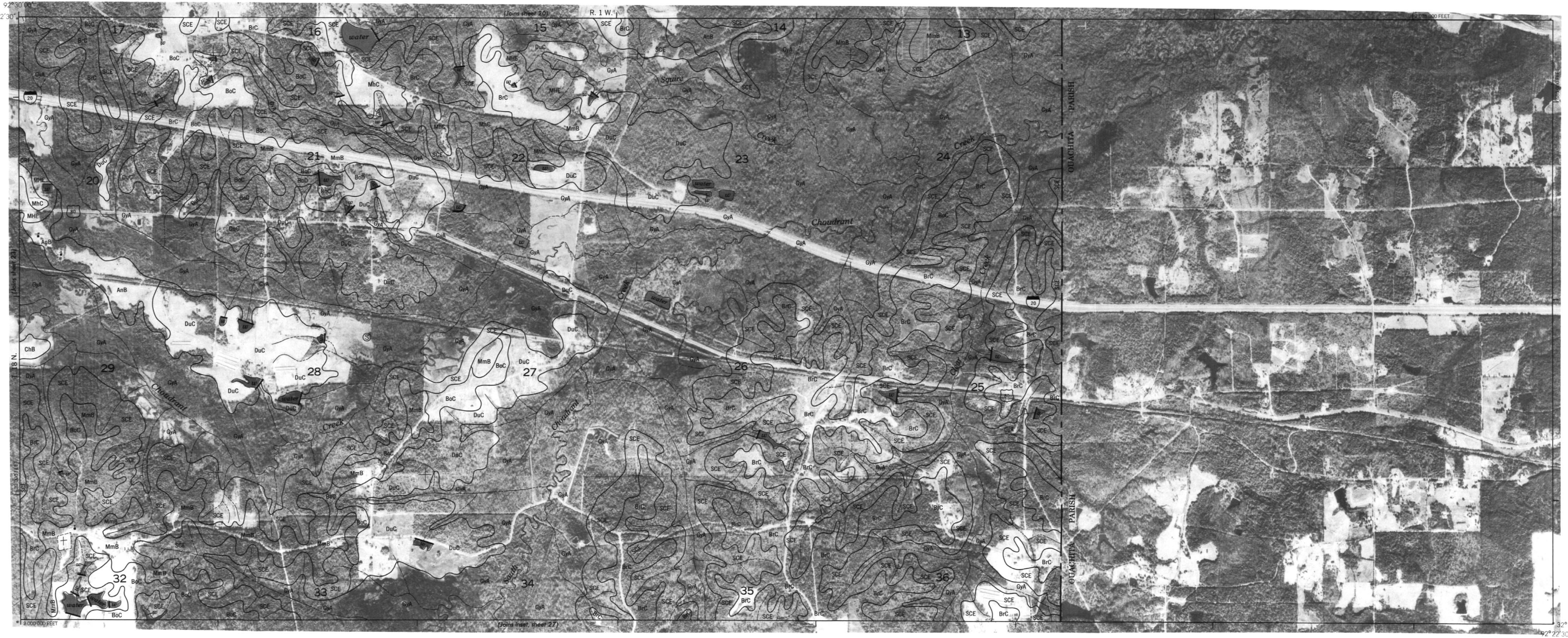

LINCOLN PARISH, LOUISIANA NO. 24

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25

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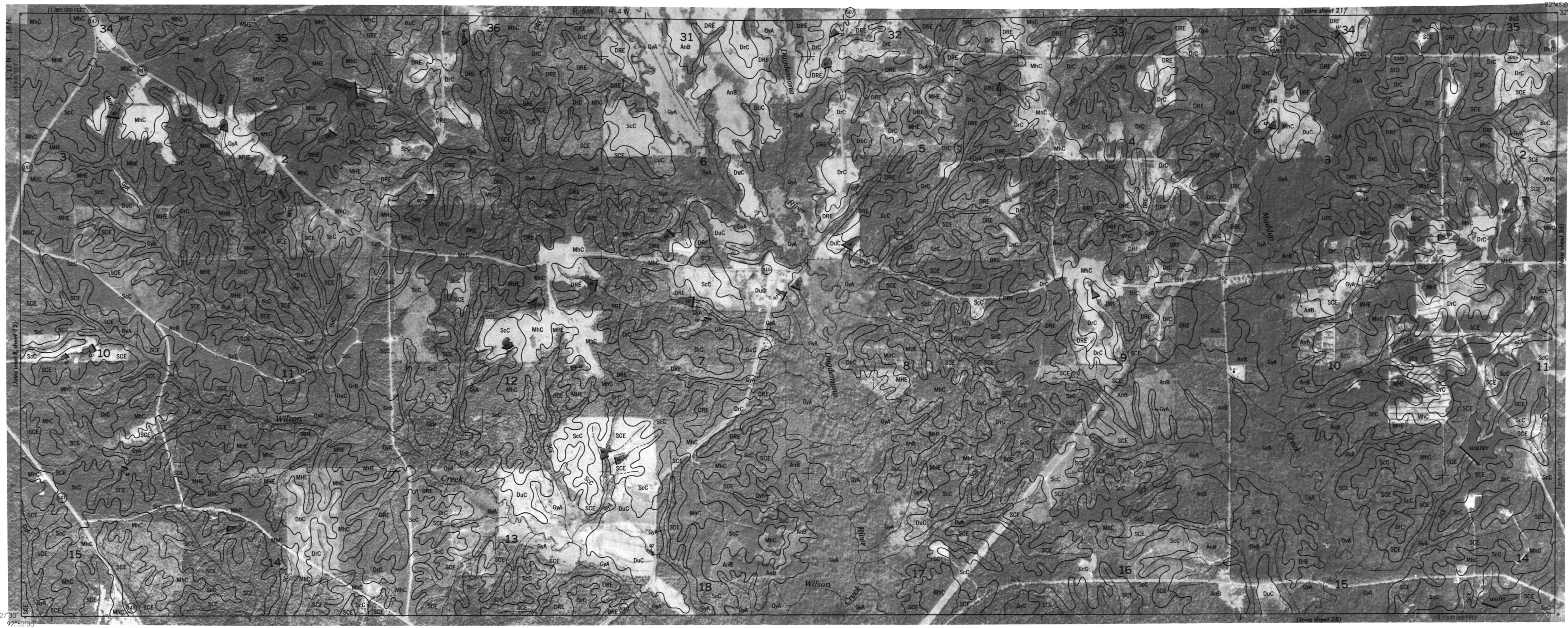
LINCOLN PARISH, LOUISIANA NO. 25



N

SCALE 1:20 000

1 MILE

1 KILOMETER

SOIL SURVEY OF LINCOLN PARISH, LOUISIANA - SHEET NUMBER 26

N

1 MILE

1 KILOMETER

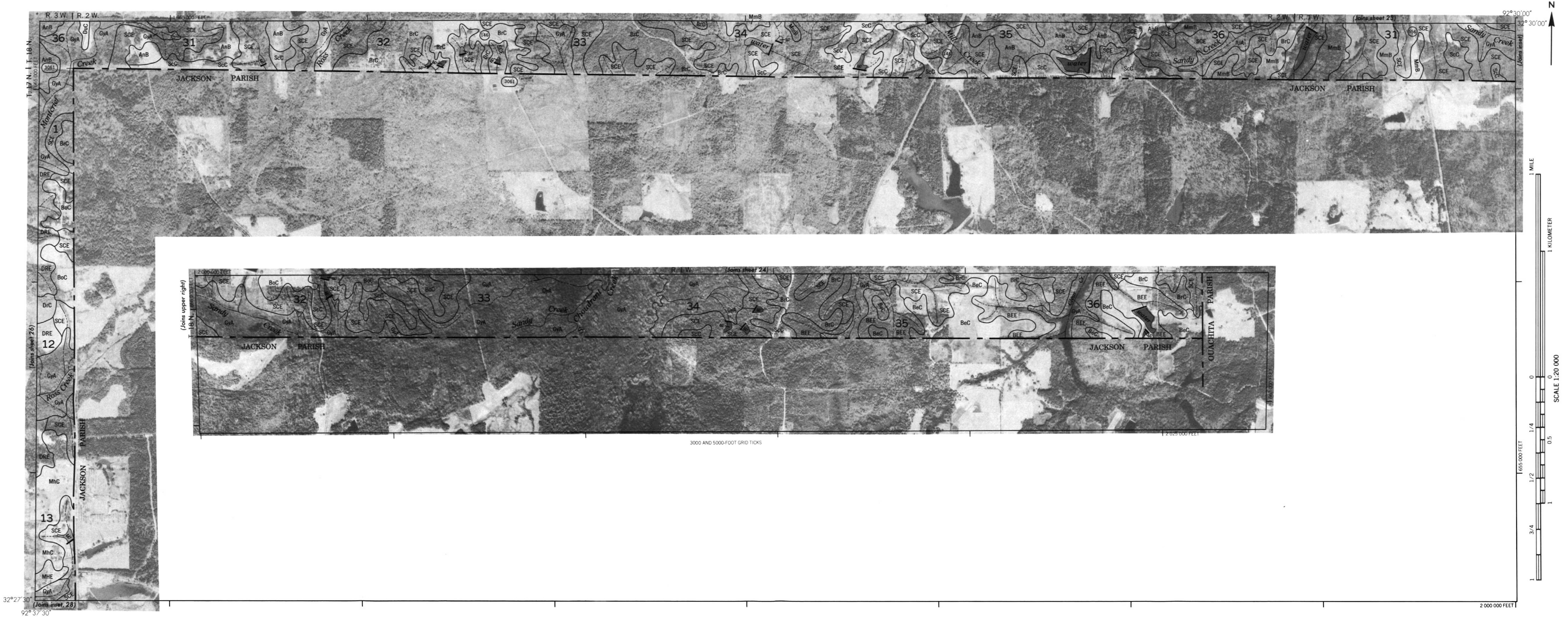
0 1/4 1/2 3/4 1

0 0.5 1

SCALE 1:20 000

LINCOLN PARISH, LOUISIANA NO. 26

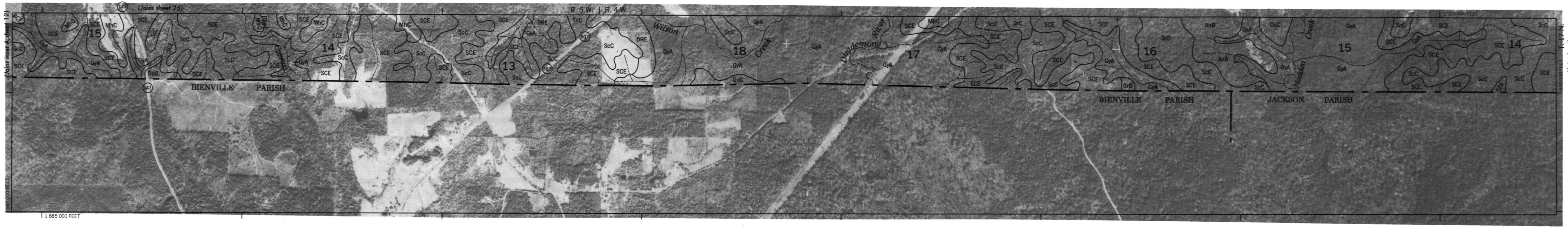
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1983-1985 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



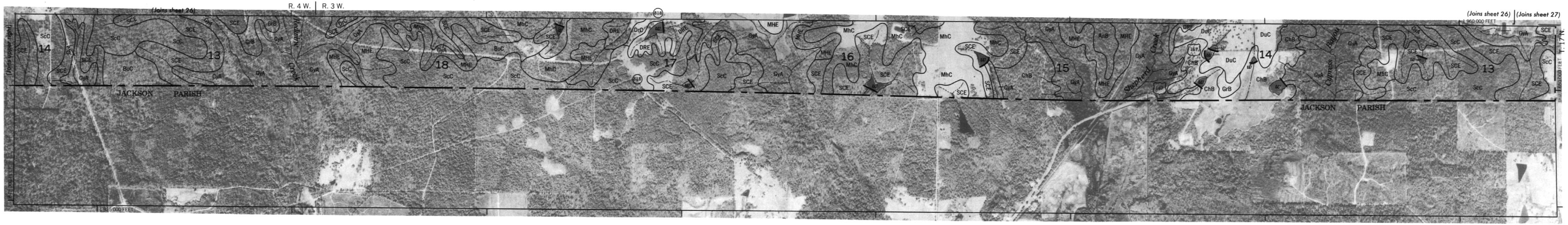
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1983 - 1985 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

28

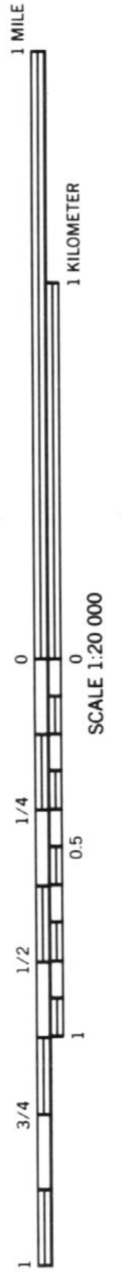
N



3000 AND 5000-FOOT GRID TICKS



3000 AND 5000-FOOT GRID TICKS



LINCOLN PARISH, LOUISIANA NO. 28

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1983-1985 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.